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THE CLAVARIA FISTULOSA GROUP

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(WITH PLATES 3-5, CONTAINING 8 FIGURES)

Plants of this group have been reported very rarely from this country. *Clavaria juncea* is listed by Dr. Peck in the 22d Report of the New York State Museum from specimens collected by Dr. Howe, and Peck says this was the first report of the species from America. It has been recently reported from Michigan by Kauffman. Clement's illustration in Minnesota Plant Studies, IV: p. 113, evidently refers to a form of the *Clavaria vermicularis* group.

Dr. Peck found a single specimen of *Clavaria fistulosa* in the Catskill Mountains in October, 1872, and this is the only collection of the species outside of Europe mentioned in the Sylloge. Professor Dearness collected the species in coniferous swamps at Avon, Canada, in October, 1897, and it was distributed in Fungi Columb. 1214 under the name *Clavaria inaequalis*. Professor Dearness has sent me specimens of the collection correctly named.

Clavaria contorta, which is supposed to be a young stage of *Clavaria fistulosa*, is said in the Sylloge to have been collected by some of the older botanists in New England and North Carolina.

The little notice the plants have received is probably due as much to the conditions under which sporophores are produced as to the rarity of the mycelium. It requires at least two weeks of daily rain, with the dead leaves on the ground continuously soaked with water, to produce a crop of *Clavaria juncea* at Neebish, Michigan. Under such conditions, specimens are usually to

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be found on the leaves in the woods and sometimes they are very abundant. *Clavaria fistulosa* is more rare. Only once have I seen it abundant at Neebish. I also found a single specimen near Lake Rosseau, in Ontario.

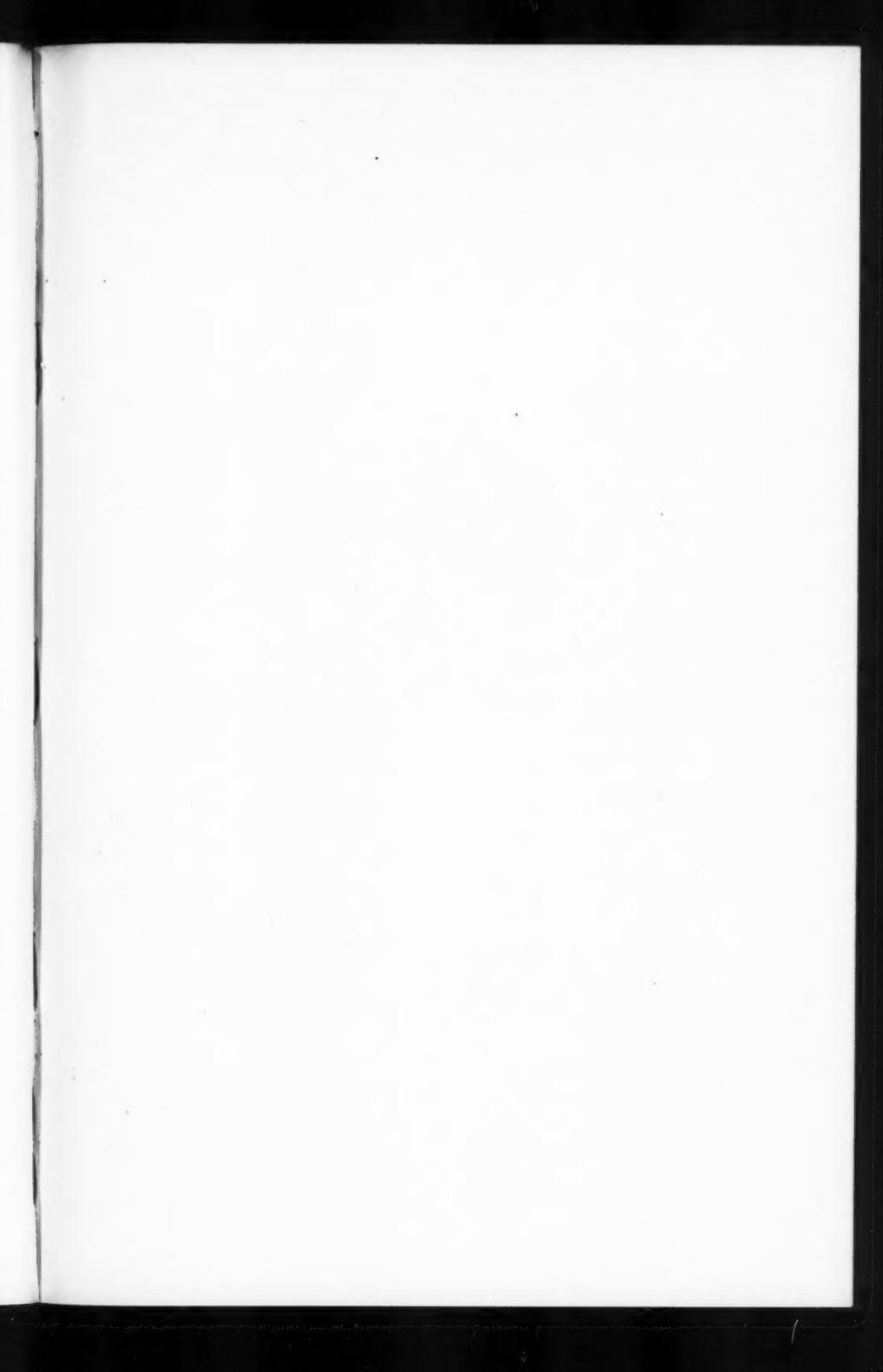
I show in the plates the following forms belonging to the group.

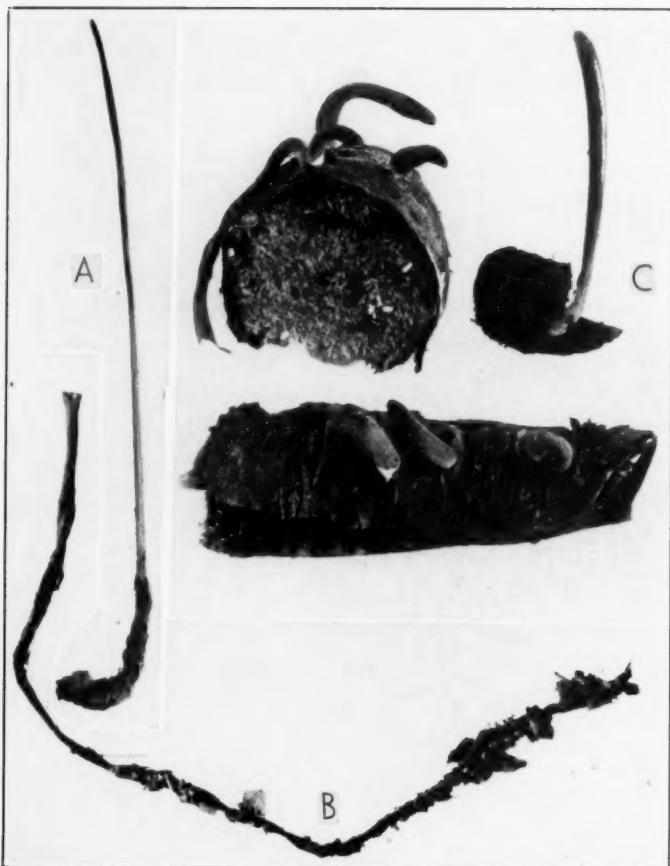
CLAVARIA ARDENIA SOW. Pl. 3

This form is more abundant than *Clavaria fistulosa* at Neebish. The clubs are enlarged and inflated at the apex. They are abruptly pointed when young but become truncate and often perforated when old. The plants are figured by Sowerby in his plate 215. The species is said to grow 8 inches high in the British Isles. Our plants were 4-7 inches high and about one fourth of an inch thick at the apex. Stevenson says it is the only form of *Clavaria fistulosa* found in the British Isles. His description reads: "Ferruginous, then date-brown, simple, very long, more than 20 cm., thickened upward, acute when young, then obtuse or hollowed out at the apex, tomentose at the base, not rooting, on fallen branches." The spores are given in the Sylloge as broad, hyaline, ovoid, apiculate at one end, $15 \times 8-9 \mu$. The description fits our plants exactly but the spores were narrower, $12-16 \times 5-7 \mu$. The plants grew on the ground in coniferous woods and the clubs were attached to small sticks by copious whitish mycelium as shown in the illustration. The species is usually considered a variety of *Clavaria fistulosa*.

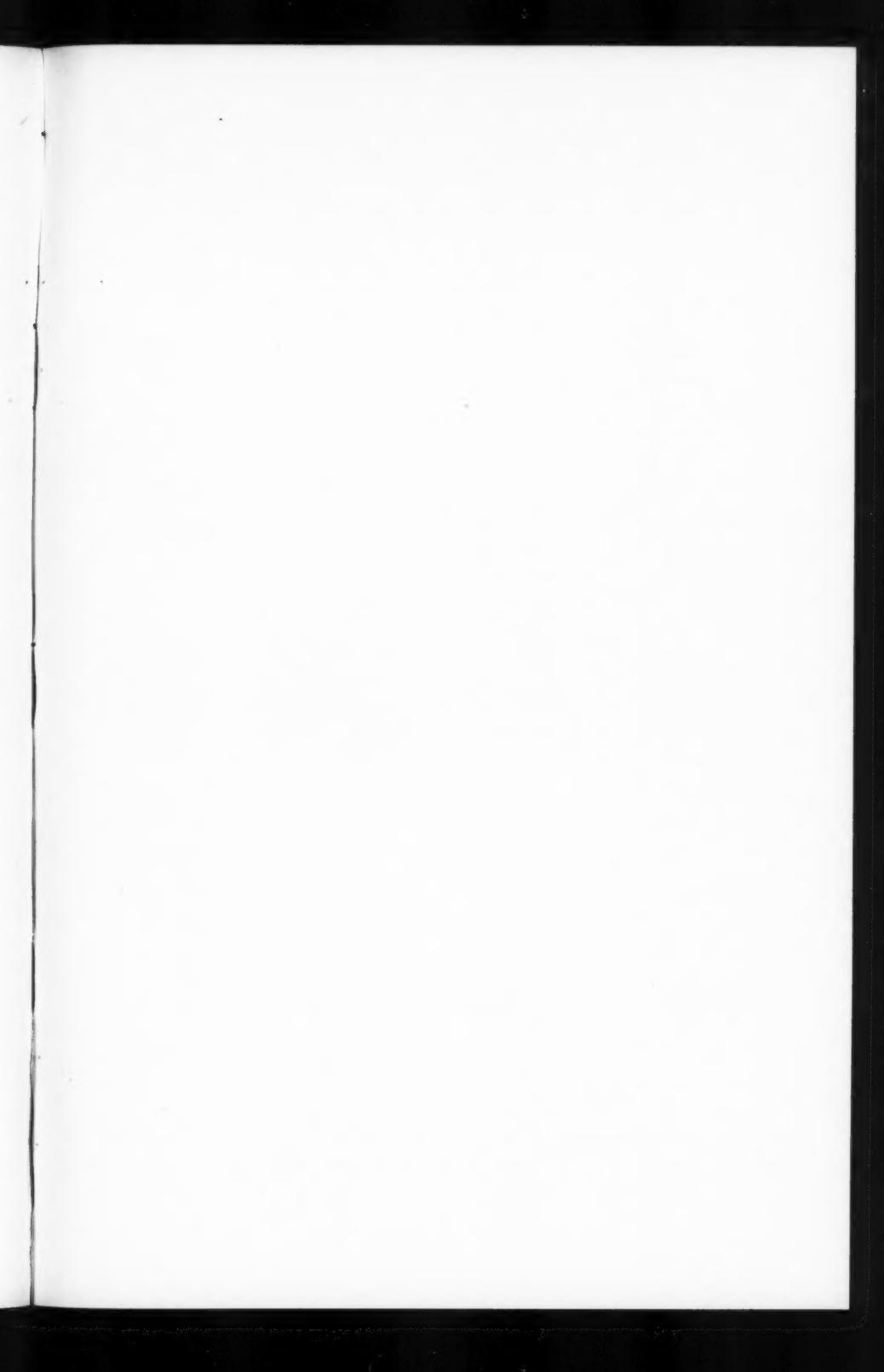
CLAVARIA FISTULOSA Fries. Pl. 4, A

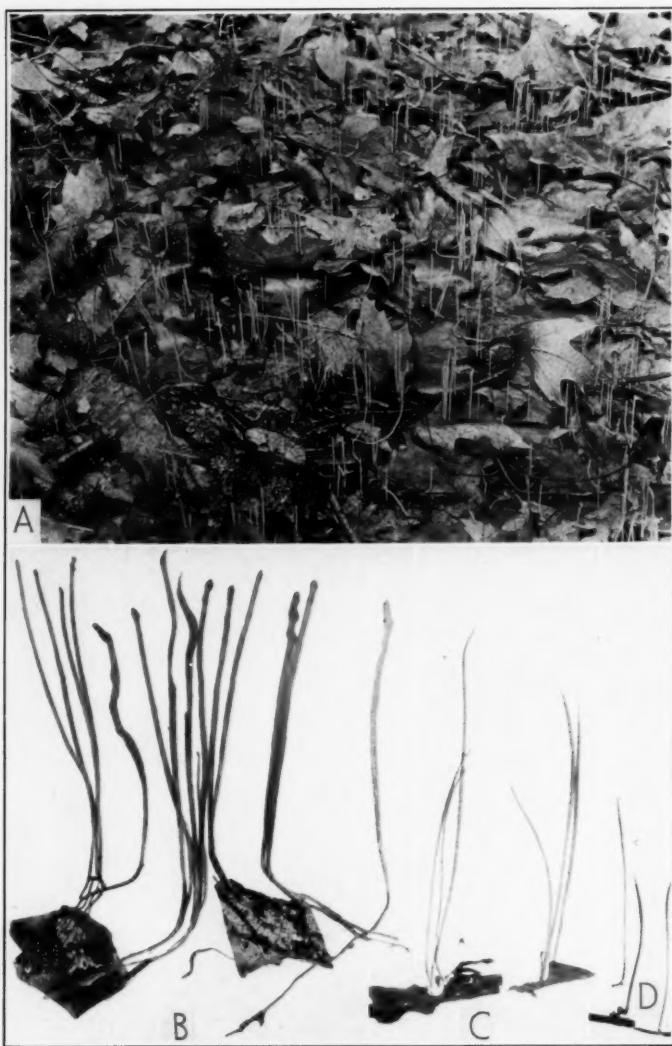
The photograph was taken from the Lake Rosseau specimen. It is not enlarged or inflated at the apex. It is the form illustrated by Britzelmayr. It appears to be typical *Clavaria fistulosa* and is described, as follows: "Simple, slender, very long, strict, fistulose, somewhat obtuse, yellow becoming reddish, root short, villous, spores ellipsoid-oblong, commonly obtuse above and attenuate at the base, hyaline, $14-16 \times 6-7 \mu$." It is said to be very closely akin to *Clavaria macrorrhiza* and was considered by Fries to be a large form of *Clavaria juncea*.





A. CLAVARIA FISTULOSA FRIES
B. CLAVARIA MACRORHIZA Sw.
C. CLAVARIA CONTORTA HOLMSK





CLAVARIA JUNCEA FRIES

CLAVARIA MACRORRHIZA Sw. Pl. 4, B

One of the plants sent me by Professor Dearness had a long rooting base. It is shown in the photograph. The top of the club was broken off, but Professor Dearness informs me it was about five inches long when collected. The plant appears to represent *Clavaria macrorrhiza*, which is described as "simple, fistulose, glabrous, subequal or somewhat thickened upward, obtuse, yellowish becoming fuscous, twisted below, rooted with a long whitish-fibrillose root." The root is said to be over three inches long and the club is 2-4 inches high. Swartz's illustration in *Vet. Akad. Handl. pl. 6, f. 1*, shows the long root perpendicular as if it grew straight down into the ground. The whole root is covered with long, white, villous hairs like those on the bases of the plants in our photographs of *Clavaria ardenia*, which seems to show that it grew attached to sticks or logs in leaf-cold. The hairs have collapsed in the dried plant from which the photograph was taken and do not show very plainly in the picture. Von Hoehnel in the *Oesterr. Bot. Zeitschrift* for December, 1904, argues that *Clavaria macrorrhiza* is a form of *Clavaria fistulosa* with a long root, and compares the roots of *Collybia esculenta* and *Collybia conigena*, which are long or short according to circumstances. He had not, however, found a plant with such a root.

CLAVARIA CONTORTA Holmsk. Pl. 4, C

I collected the specimens from which the photographs were taken on branches of dead alder at Neebish, Michigan, in October, 1911, and identified them as *Clavaria contorta*. The figures are reproduced natural size. The plants were on branches of a fallen tree above ground and I did not connect them with *Clavaria fistulosa*, which I have always found on sticks buried in leaves in coniferous woods. Von Hoehnel in the article mentioned above holds that *Clavaria contorta* is a young stage of *Clavaria fistulosa* and since reading his arguments I am inclined to agree that at least they belong to the same group. The tall, straight plant is very much like *Clavaria fistulosa*. The club is hollow with a very thin wall just like the section of *Clavaria ardenia* shown in the frontispiece. The substance of both is com-

posed of narrow, straight hyphae with large lactiferous tubes, and the spores are the same. In these small plants they average larger than in *Clavaria fistulosa*, $14-18 \times 6-9 \mu$. The color of both species is the same. The young plants are stuffed and directly erumpent from the wood. Von Hoehnel found such forms as these growing with specimens of true *Clavaria fistulosa*. The usual description of *Clavaria contorta* reads: "Plants simple, erumpent, stuffed, spongy-fleshy, soft to the touch, somewhat twisted, rugose, obtuse, pruinose, watery-yellow. On dead branches of alder, hazel, etc. 2.5-3 cm. high, 6-9 mm. thick."

Von Hoehnel thinks that *Clavaria brachiata* Fries is also a form of *Clavaria fistulosa*, with the clubs branching.

CLAVARIA JUNCEA Fries. Pl. 5

The plants grow on dead leaves of frondose trees and the decumbent, creeping base is attached to the leaf by white, villous mycelium. The mycelium appears to live in the mould and grows up over the leaves to form the fruiting clubs. The erect club is about 2 inches high, slender and straight, either obtuse at the apex as in *B* or acute as in *C*. Under favorable weather conditions the plants are very numerous and cover the leaves over wide spaces as shown in *A*. On one occasion there was a thick forest of these slender clubs on both sides of a path in the woods covering the leaves for a distance of twenty-five feet. The description of the species reads: "Gregarious, thin, filiform, flaccid, fistulose, acute, from pallid to rufescent, base creeping, fibrillose." According to Winter, the spores are obovoid, 4μ in diameter. Schroeter gives the measurements as $8-9 \times 4-5 \mu$. In our plants, the spores are $9-12 \times 4-5 \mu$ and shaped like those in the other species in the group.

Clavaria juncea is the most common species in the group and has been illustrated seven times, according to Saccardo in the nineteenth volume of his "Sylloge." It is also reported from Ceylon and Australia.

Var. *vivipara* is a form reported in Europe and figured by Bulliard in his plate 463 and also by Britzelmayr. It has the club as well as the rooting base fibrillose on the sides. In all the Neebish plants the erect portion of the club was smooth.

In localities where the plants were not abundant, smaller forms like those in *D* were found with the others. They were sometimes attached to balsam needles. They appeared to be the same species, however. They resemble species of *Typhula*, but there is no sclerotoid tuber at the base.

Clavaria juncea is quite distinct from other members of the group, but it has the same essential features; hollow, thin-walled clubs composed of straight, parallel hyphae 6-8 μ in diameter, with many cross partitions. The plants are tough and elastic and it is difficult to keep them from curling long enough to make a photograph. They remain fresh but a short time and when dry are not easy to find.

The forms or species in this group are well characterized and quite distinct from other club-fungi. The external resemblance is perhaps nearest to some species of *Typhula* or species of *Clavaria* with caespitose clubs.

The real phylogenetic connection of the members of the group with each other is unknown and the superficial resemblances may be misleading. All the forms should be described, but kept together in a single group.

GENESEO, ILL.

EXPLANATION OF PLATES 3-5

- Plate 3. *Clavaria ardenia* Sow.
- Plate 4. *A. Clavaria fistulosa* Fries. $\times \frac{2}{3}$.
B. Clavaria macrorrhiza Sw.
C. Clavaria contorta Holmsk.
- Plate 5. *A, B, C, D, Clavaria juncea* Fries.

THE DISTRIBUTION OF FUNGI IN PORTO RICO

BRUCE FINK

What follows is based on a sojourn of two months in Porto Rico, in November and December, 1915, and January, 1916. The fungous flora was examined in several areas, selected to give a good knowledge of the fungi of the island as a whole. The collecting stations were about San Juan, Rio Piedras, Rio Grande, Mameyes, Vega Baja, Manati, Mayagüez, Yauco, Aibonito, and Naranjito. These areas were selected to give a view of the island from end to end and from side to side, and as much variety as possible with respect to elevation and rainfall. All elevations were reached from sea level to the highest on the island, 4,985 feet. All conditions with respect to precipitation of moisture were reached, from the desert conditions on the south side of the island with 15 to 30 inches per annum to 125 to 150 inches about El Yunque.

Each day's collecting occupied long hours and often long tramps, stopping neither for heat nor rain. The hand lens was used freely in the field, and no specimens were taken that did not seem to be in condition for determination. This method gave somewhat more than 2,200 numbers. Had specimens been taken without examination, probably two or three times as many could have been secured. Yet it is doubtful whether the larger amount of work required to study such a collection would add sufficiently to the results to warrant the method.

The prime purpose of the itinerary was to collect the ascomycetes. After these the agarics and the pore fungi received most attention. Among the ascomycetes, the Graphidaceae and the Arthoniaceae received first attention. The rusts and the imperfect fungi which grow on living plants had been collected by F. L. Stevens and others, and these, with the smuts, were passed over. All other fungi were taken as seen; but those outside the

groups to which special attention was directed were not, of course, secured in large numbers. The ascomycetes were very abundant, and areas a few rods square, which at first looked most unpromising, often held the collector for hours, taking the fungi from bark, leaves, rocks, pebbles, and soil.

Regarding the fungous flora in general, the rusts, the imperfect fungi, the black *Perisporiaceae*, the crustose lichens, the pyrenomyctes, and the *Hysteriaceae* abound. Foliose and fruticose lichens are frequent but scarcely common. Fleshy discomycetes were seen infrequently; but these are difficult to detect, unless one is giving sole attention to them. Agarics are by no means common. Pore fungi were seen more often; but these are scarcely frequent, excepting a few species. Mycelia of the *Erysibaceae* were seen occasionally, but diligent search failed to reveal any evidence of fruiting. The crustose, often inconspicuous *Graphidaceae* are the most common fungi; and the even more obscure *Arthoniaceae* are perhaps next in abundance, though so inconspicuous as to be seen infrequently, except by one well acquainted with the group.

A question about which little seems to be known is whether lichens occur commonly on rocks in the tropics. The rocks were found to bear quite as abundant and perhaps as varied an assemblage of lichens as do similar rocks in temperate regions. At lower elevations the flora of the rocks was peculiar and doubtless tropical, but from 2,000 to 5,000 feet the general appearance of the lichens was about the same as that commonly seen in temperate regions. It is not easy to secure lichens growing on rocks, especially in hot climates; and the failure to get more lichens from tropical rocks evidently does not signify that the plants are absent from such substrata.

Perhaps the thing that would impress the average mycologist most is the absence of the white *Erysibaceae* in fruit and the great abundance of the black *Perisporiaceae* in fruited condition. One accustomed to collecting in temperate regions will instinctively examine each white mycelium, expectant of that which seldom if ever results, the finding of perithecia. The white mycelia are rare and are seldom if ever fruited, while the black ones are abundant and are well fruited, except in the desert regions.

To those not acquainted with the tropics, it will probably be a little difficult to realize that the larger basidiomycetes are not abundant or even common. The short-lived agarics are seen but infrequently, and then as isolated specimens, or at best in small numbers. One may see as many in an hour in certain good areas in the mountains of Virginia or Kentucky as he would find in a month in Porto Rico. When seen here, the plants are usually in some well-protected spot, and solitary or so few in number that it is difficult or impossible to get a satisfactory herbarium specimen. Probably great tropical heat is the factor that accounts mainly for the infrequent occurrence of these plants. But the development of the sporophores in many areas of the moist and uniformly heated tropics is probably spread about equally throughout the year, and this would account for the infrequent occurrence of the sporophores at any particular time. Studies of conditions in tropical areas which have wet seasons alternating with dry ones would be interesting in this respect. Such an area was reached about Mayagüez, but the region was, unfortunately, examined during the dry season. The tougher, more durable pore fungi are seen more frequently, but these are by no means common.

The region about Yauco was extremely interesting with respect to the distribution of fungi. In the city and in the flat country to the south, one is in a desert with a rainfall of probably 20 to 30 inches per annum, while in the mountains four or five miles to the north there is abundant rain. In the one area agriculture is possible only through irrigation. In the other, rainfall is abundantly sufficient for agricultural purposes. Day after day rain fell in the mountains a few miles north of Yauco, while in Yauco and to the south the weather was dry. The mycologist is of course interested to know how the fungous flora is affected. Agarics and pore fungi were almost entirely absent south of Yauco, but were seen as often five miles to the north as in other parts of the island. The black *Perisporiaceae* were entirely absent from the desert, while they were abundant on leaves north of Yauco. To the uninitiated, the lichen flora of this desert would appear most uninviting, for scarcely a foliose or a fruticose

specimen was seen. However, rocks, bark, and wood were plastered over with crustose, usually inconspicuous forms. Indeed, the largest collection of fungi secured in a single day was 105 specimens obtained the first day in the desert south of Yauco. This collection will prove of special value for the large number of Graphidaceae and Arthoniaceae taken. No fleshy discomycetes were seen in the desert. No fungi were seen on the leaves, except possibly an occasional rust or an imperfect fungus, though fungi of various kinds abound on leaves in other parts of the island. No myxomycetes were seen south of Yauco, while these plants are common north of the city. The change in fungous flora in passing one mile or at most two miles northward from Yauco is most astonishing. The remarkable accompanying change in seed-plant flora is quite as interesting, but this lies outside the limits of this paper.

The collection has not been studied sufficiently to permit a more detailed statement regarding distribution; but the general account given above will, it is hoped, prove interesting and valuable. The great interest and value that would result from floristic and ecologic studies of the fungous flora of the island as a whole, and extending over many years, were distinctly realized during my short sojourn there. Much of great interest and value to the botanist and to the agriculturist and the horticulturist as well would result from such a detailed study of the fungous flora of Porto Rico.

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THE AGARICACEAE OF TROPICAL NORTH AMERICA—VIII

WILLIAM A. MURRILL

In *Mycologia* for January, 1918, the first six genera in the subtribe Agaricaneae were discussed; the remaining eight having been reserved for the present paper, which concludes the series. For a key to the genera of this subtribe, see *Mycologia* 10: 15. 1918.

The total number of tropical agarics treated by me in this series of articles and in *North American Flora*, exclusive of doubtful species, amounts to 525, of which number 300 are newly described. A great many species would doubtless be added by further exploration, which is very much needed.

7. DROSOPHILA Quél. Ench. Fung. 115. 1886

Lachrymaria Pat. Hymén. Eur. 122. 1887.

Cortinopsis Schroet. Krypt.-Fl. Schles. 3¹: 566. 1889.

Glyptosperma Fayod, Ann. Sci. Nat. VII. 9: 377. 1889.

Gymnochilus Clements, Bot. Surv. Neb. 4: 23. 1896.

Hypholomopsis Earle, Bull. N. Y. Bot. Gard. 5: 436. 1909.

This genus, well represented by the common species, *D. appendiculata*, is distinguished from other brown-spored genera by an appendiculate veil, fleshy stipe, adnate or adnexed lamellae, and a pileus usually thin, fragile, and solitary or subcespitoso. The number of temperate species is large and their characters rather indistinct. Several cespitose species occur in tropical America.

Species occurring on cultivated or exposed soil.

Hymenophores solitary.

| | |
|-------------------------|------------------------------|
| Stipe 2 mm. thick | 1. <i>D. castaneidisca</i> . |
| Stipe 7 mm. thick | 2. <i>D. brevipes</i> . |

Hymenophores gregarious, rarely cespitose.

- Pileus grayish-brown, argillaceous when dry.. 3. *D. campestris.*
- Pileus dark-brown or reddish-brown, paler when dry ..
- Spores very pale, $11-13 \mu$ long
- Spores darker and shorter

Species occurring among humus in woods.

- Hymenophores solitary.
- Pileus umbonate
- Pileus not umbonate

Hymenophores subcespitoso

Species occurring on dead wood either buried or exposed.

- Hymenophores solitary or gregarious.
- Spores truncate
- Spores not truncate

Hymenophores densely cespitose.

- Stipe 5-7 cm. long; margin of pileus not striate. 11. *D. appendiculata.*
- Stipe 6-12 cm. long; margin of pileus faintly striate
- 12. *D. caespitosa.*

1. *Drosophila castaneidisca* sp. nov.

Pileus thin, convex, solitary, 2.5 cm. broad; surface hygrophanous, avellaneous, slightly tinged with chestnut, pale-chestnut on the disk; margin straight, entire, concolorous, striate; lamellae adnate, narrow, crowded, chestnut; spores ellipsoid or ovoid, smooth, pale-bay under the microscope, $7 \times 3.5-4.5 \mu$; stipe cylindric, equal, smooth, white, furfuraceous, 3 cm. long, 2 mm. thick.

Type collected in soil on a rubbish heap in Castleton Gardens, Jamaica, 180 m. elevation, December 14, 15, 1908, *W. A. & Edna L. Murrill* 117. Known only from the type locality.

2. *Drosophila brevipes* sp. nov.

Pileus broad, thin, fleshy, irregularly convex, obtuse, not fully expanding, solitary, 4-5 cm. broad; surface dry, corrugate and plicate, pale-tan, darker on the disk, delicately floccose from the remains of the veil, substriate on the margin, which becomes upturned on drying; context without odor; lamellae adnate, crowded, rather narrow, uneven and many times inserted, pallid to brown; spores ellipsoid, smooth, opaque, distinctly purplish-brown under the microscope, uniguttulate, about $9 \times 4.5 \mu$; cystidia few, delicate, hyaline, subcylindric, about $50 \times 12 \mu$; stipe tapering downward, whitish, minutely whitish-flocculose above, fibrillose-

lacerate below, hollow, 5 cm. long, 7 mm. thick; veil white, evanescent.

Type collected in red soil in the Botanic Garden at Santiago de las Vegas, Cuba, January 11, 1906, F. S. Earle 500. Known only from the type locality. Professor Earle's very complete notes are accompanied by two excellent photographs. The species has somewhat the appearance of *D. appendiculata* and also has cystidia.

3. *Drosophila campestris* (Earle)

Gymnochilus campestris Earle, Inf. An. Estac. Centr. Agron. Cuba 1: 238. 1906.

Hypholoma campestre Morg. Jour. Myc. 14: 30. 1908.

Described from specimens collected by Earle on Bermuda grass lawns at Santiago de las Vegas, Cuba.

Cuba, Earle 363.

4. *Drosophila pallidispora* sp. nov.

Pileus thin, irregular, campanulate, at length spreading at the margin, gregarious, 3 cm. broad; surface hygrophanous, silky, very faintly striate, at first chestnut, fading to pale-tan, pallid when dry; context thin, with mild, slightly mawkish taste; lamellae adnexed, broad, crowded, pale-argillaceous, at length brown; spores oblong-ellipsoid, smooth, almost hyaline under the microscope but with a pale-umbrinous tint, $11-13 \times 4.5-5.5 \mu$; stipe slightly tapering upward, fibrillose, white, hollow, 5-6 cm. long, 3-5 mm. thick; veil scarcely appendiculate but forming deciduous flocs on the young pileus.

Type collected in soil in a garden at Herradura, Cuba, August 17, 1907, F. S. Earle 572. Known only from the type locality.

5. *Drosophila flocculosa* (Earle)

Gymnochilus flocculosus Earle, Inf. An. Estac. Centr. Agron. Cuba 1: 238. 1906.

Hypholoma flocculosum Morg. Jour. Myc. 14: 65. 1908.

Described from specimens collected by Earle on moist red earth under buildings at Santiago de las Vegas, Cuba.

Cuba, Earle 136, 144.

6. *Drosophila tepeitensis* sp. nov.

Pileus convex to nearly plane, with a low umbo, solitary, 2.5 cm. broad; surface glabrous, hygrophanous, radiate-rugose, dull-latericious, smooth and dark-brown on the umbo; margin undulate, dark-fuliginous; lamellae adnate, plane, rather distant, brown to black at maturity; spores elongate-ellipsoid, smooth, opaque, castaneous-fuliginous under the microscope, $12-13 \times 7 \mu$; stipe tapering upward, smooth, nearly glabrous, hygrophanous, dull-white, hollow, 8 cm. long, 5 mm. thick near the base.

Type collected on the ground among rich humus in woods in the Tepeite Valley near Cuernavaca, Mexico, 2,100 m. elevation, December 28, 1909, *W. A. & Edna L. Murrill* 483. Another specimen collected in the same locality (No. 467) appears to be the same but has a stipe that is much longer and covered with dense tomentum at the much swollen base.

7. *Drosophila jalapensis* sp. nov.

Pileus convex to plane, thin, not umbonate, solitary, 4 cm. broad; surface glabrous, hygrophanous, striate, dull-avellaneous-isabelline, with isabelline disk; margin entire, concolorous; lamellae adnate, crowded, rather narrow, dark-purplish-brown at maturity; spores oblong-ellipsoid, smooth, not abruptly contracted at the ends, opaque, bay under the microscope, $9 \times 4.5 \mu$; stipe long and slender, equal or slightly tapering upward, smooth, glabrous, white, fragile, hollow, 14 cm. long, 4 mm. thick.

Type collected on the ground among humus in woods at Jalapa, Mexico, 1,500 m. elevation, December 12-20, 1909, *W. A. & Edna L. Murrill* 170. Known only from the type locality.

8. *Drosophila tenuis* sp. nov.

Pileus very thin and fragile, convex, subcespitoso, 3-4 cm. broad; surface hygrophanous, subglabrous, brownish, paler when dry, faintly striate; context very thin and watery; lamellae adnexed or adnate, subcrowded, rather broad, reddish-brown at maturity; spores ellipsoid, smooth, decidedly purplish-brown under the microscope, $7-8 \times 4-5 \mu$; stipe cylindric, glabrous, shining, white, fragile, hollow, 7-8 cm. long, 3 mm. thick; veil not evident when collected.

Type collected on the ground in woods at the base of El

Yunque Mountain, Cuba, March, 1903, *L. M. Underwood & F. S. Earle* 415. Known only from the type locality.

9. ***Drosophila truncatispora* sp. nov.**

Pileus becoming slightly convex, not quite fully expanding, regular in shape, not umbonate, solitary or gregarious, 2.5 cm. broad; surface hygrophanous, avellaneous, with pale-isabelline-fulvous, imbricate, floccose scales, which are not very conspicuous but are nevertheless distinct; margin entire, concolorous; lamellae adnexed, plane, broad, subdistant, avellaneous to pale-chestnut; spores ovoid with truncate ends, somewhat like a grain of corn in horizontal outline, smooth, purplish-brown under the microscope, 1-2-guttulate, $6-7 \times 4-5 \mu$; stipe short, equal, smooth, white, fragile, hollow, 4 cm. long, 3 mm. thick.

Type collected on rotten wood or humus in a moist river valley at Xuchiles, near Cordoba, Mexico, 450 m. elevation, January 17, 1910, *W. A. & Edna L. Murrill* 1144. Also collected at the same time and in the same locality, *W. A. & Edna L. Murrill* 1128.

10. ***Drosophila atricastanea* sp. nov.**

Pileus subfleshy, soft, delicate, broadly campanulate to subexpanded, gregarious, 2-3 cm. broad; surface strongly hygrophanous, glabrous, dark-chestnut, becoming pallid when dry except on the disk; margin concolorous, not striate; lamellae adnate, crowded, rather broad, concolorous; spores broadly ellipsoid or ovoid, smooth, rounded at both ends, very pale purplish-brown with a yellowish tint under the microscope, subtransparent, $6-8 \times 4-5 \mu$; stipe subcylindric, white, minutely floccose, hollow, 4-5 cm. long, 2-4 mm. thick; veil said to be wanting, even in young stages.

Type collected on buried wood in a banana field at Santiago de las Vegas, Cuba, June 17, 1904, *F. S. Earle* 83. Known only from the type locality. This species is peculiar in having no veil, and the spores are pale and very broad, although not truncate.

11. ***DROSOPHILA APPENDICULATA* (Bull.) Quél. Ench. Fung. 116. 1886**

This is a very common edible species, widely distributed in temperate regions. Patouillard reports it common in Guadeloupe.

I have found it rather scarce in tropical regions during the winter but it may be more abundant there during the rainy season.

Cuba, *F. S. Earle* 289; Santo Domingo, *J. R. Johnston* 803; Jamaica, at low elevations, *W. A. Murrill* 230, 825; Colima, Mexico, *W. A. Murrill* 612, 617.

12. *Drosophila caespitosa* (Earle)

Gymnochilus caespitosus Earle, Inf. An. Estac. Centr. Agron. Cuba 1: 240. 1906.

Hypholoma caespitosum Morg. Jour. Myc. 14: 29. 1908.

Known only from specimens collected by Earle at the base of a stump in a garden at Santiago de las Vegas, Cuba.

8. *HYPHOLOMA* (Fries) Quél. Champ. Jura Vosg. 112. 1872

Agaricus § *Hypholoma* Fries, Syst. Myc. 1: 287. 1821.

Naematoloma P. Karst. Bidr. Finl. Nat. Folk 32: 495. 1879.

This genus differs from *Drosophila* in having a dry, glabrous, firm, densely cespitose hymenophore. It contains few species, but they are abundant in temperate regions and have been much confused among themselves.

Pileus acutely umbonate 1. *H. papillatum*.
Pileus not acutely umbonate.

Pileus yellow or reddish 2. *H. fasciculare*.

Pileus some shade of green, at least when young.

Lamellae white; stipe 5-10 cm. long 3. *H. tuberculatum*.

Lamellae green; stipe 3-4 cm. long 4. *H. flavovirens*.

1. *HYPHOLOMA PAPILLATUM* Pat. Bull. Soc. Myc. Fr. 14: 54.
1898

Described from specimens collected by Paul Maury on decaying logs in Mexico. Known only from the type locality.

2. *HYPHOLOMA FASCICULARE* (Huds.) Quél. Champ. Jura Vosg. 113. 1872

This very common temperate species has been frequently reported from tropical North America by Patouillard and others,

and one would expect it to occur there at high elevations. There are, however, certain tropical species with which it might be confused by the superficial observer.

3. *HYPHOLOMA TUBERCULATUM* Pat. Bull. Soc. Myc. Fr. 15: 196. 1899

Described from specimens collected by Duss at Basse-Terre, Guadeloupe, on old trunks of *Hura crepitans*. Known only from the type locality. Morgan transferred this species to *Stropharia* because of its persistent annulus, while Patouillard placed it in *Hypholoma* probably because of its close relationship to *H. fasciculare*.

4. *Hypholoma flavovirens* sp. nov.

Pileus convex, not umbonate, densely cespitose, 2-3 cm. broad and about 5 mm. high; surface dry, glabrous, faintly rugose, pale-flavovirens; lamellate adnate, arcuate, narrow, crowded, flavovirens, becoming pale-purplish-brown at maturity; spores ellipsoid or elongate-ovoid, smooth, usually 2-guttulate, very pale purplish-brown under the microscope, $7 \times 4 \mu$; stipe equal, smooth, glabrous, pale-flavovirens, slightly ochraceous below, 3-4 cm. long, 2-2.5 mm. thick; veil slight, appendiculate, evanescent.

Type collected on decayed logs and stumps at Cinchona, Jamaica, 1,500 m. elevation, December 25, 1908, *W. A. & Edna L. Murrill* 553. Also collected at Cinchona, Jamaica, *W. A. & Edna L. Murrill* 534; on a log on Sir John Peak, Jamaica, *W. A. Murrill* 782; on a rotten stump at Mooretown, Jamaica, *F. S. Earle* 559; and on a stump at Jalapa, Mexico, *W. A. & Edna L. Murrill* 72, 74. This species occurs in abundance at Cinchona on dead logs and stumps in the vicinity of the laboratory. It closely resembles *Psilocybe subviridis* and also suggests *Hypholoma fasciculare*.

9. *PILOSACE* (Fries) Pat. Hymén. Eur. 122. 1887

Agaricus § *Pilosace* Fries, Nova Acta Soc. Sci. Upsal. III. 1: 25. 1851.

This genus has a fleshy stipe and purplish-brown spores, but differs from *Agaricus* in being without a veil. There are very

few species. The two given below from tropical America are taken from the studies of Fries based on unusually poor colored drawings by Oersted. I have been unable to find any specimens. It is just possible that Oersted's specimens really belonged to *Agaricus* and that the veil had been lost.

Pileus 5 cm. broad, white with white scales..... 1. *P. hololepis*.
 Pileus 10 cm. broad, white with black scales 2. *P. tricholepis*.

1. PILOSACE HOOLEPIS (Fries) Sacc. Syll. Fung. 5: 1011. 1887

Agaricus hololepis Fries, Nova Acta Soc. Sci. Upsal. III. 1: 25. 1851.

Known only from specimens collected on the ground in Costa Rica by Oersted.

2. PILOSACE TRICHOLEPIS (Fries) Sacc. Syll. Fung. 5: 1010. 1887

Agaricus tricholepis Fries, Nova Acta Soc. Sci. Upsal. III. 1: 25. 1851.

Described from specimens said by Fries to have been collected on manured ground in the island of St. Thomas. Oersted's drawing bears the name St. Croix. This species is very much like *Agaricus*, but "without a trace of a veil."

10. GOMPHIDIUS Fries, Gen. Hymen. 8. 1836

This genus is distinguished by its glutinous veil; decurrent, waxy lamellae; and black, elongate spores. There are very few species and these occur mostly in temperate regions. The single tropical species is known only from Cinchona, Jamaica, at an altitude of 1,500 meters.

1. *Gomphidius jamaicensis* sp. nov.

Pileus convex, slightly umbonate, 3-5 cm. broad; surface dark-brown, blackening on drying, decorated with imbricate, glutinous scales, not striate on the margin; context mild to the taste, yellowish, slowly changing to brownish; lamellae decurrent, arcuate, broad, subdistant, dull-pinkish-yellow to gray, blackening on dry-

ing; spores fusiform, smooth, black, $16-18 \times 5-6 \mu$; cystidia clavate, opaque at the ends, abundant, 125μ long; stipe tapering downward, concolorous, solid, blackening at the apex on drying, decorated with reddish-brown fibrils, 4-8 cm. long, 4-8 mm. thick; veil forming an evanescent annulus.

Type collected on the ground at Cinchona, Jamaica, 1,500 m. elevation, November 1, 1902, F. S. Earle 352. Known only from the type locality.

II. *STROPHARIA* (Fries) Quél. Champ. Jura Vosg. 110. 1872
Agaricus § *Stropharia* Fries, Monog. Hymen. Suec. 1: 409.
 1857.

Geophila Quél. Ench. Fung. 111. 1886.

This rather large genus is distinguished by a fleshy stipe, adnate or adnexed lamellae, and the presence of an annulus, which last is somewhat uncertain at times because of its evanescent character. Several of the species grow on manure or manured ground and are widely distributed. There is considerable tropical material of this genus in the herbarium of the New York Botanical Garden, some of it evidently representing new species, but most of it is poorly dried and without notes and it is impossible to work it in this shape. Such specimens are retained only in the hope that they may some day be matched up with more recent specimens that have been better studied and better preserved.

| | |
|---|----------------------------|
| Pileus dry. | |
| Pileus solitary | 1. <i>S. troyana</i> . |
| Pileus cespitose. | |
| Stipe 2-4 mm. thick | 2. <i>S. floccosa</i> . |
| Stipe 5-10 mm. thick | 3. <i>S. caespitosa</i> . |
| Pileus viscid, at least when young and moist. | |
| Lamellae entire; spores very large. | |
| Stipe 3-5 mm. thick; pileus not umbonate | 4. <i>S. semiglobata</i> . |
| Stipe 5-10 mm. thick; pileus umbonate | 5. <i>S. cubensis</i> . |
| Lamellae serrate; spores $7 \times 5 \mu$ | 6. <i>S. bermudensis</i> . |

1. *Stropharia troyana* sp. nov.

Pileus convex to depressed, scattered, 4 cm. broad, about 1 cm. thick; surface dry, glabrous, smooth, isabelline, fulvous at the center, the cuticle cracking toward the margin; lamellae slightly

sinuate, close, of medium breadth, dull-white to umbrinous; spores oblong-ovoid, or ellipsoid, smooth, granular with several small nuclei, murinous-umbrinous under the microscope, not opaque, $7-9 \times 4-4.5 \mu$; stipe thick, fleshy, cylindric, equal, hollow, creamy, glabrous, striate above, smooth below, white at the base, 4 cm. long, 1 cm. thick; annulus large, persistent, sheathing, fixed below, white to discolored, serrate above from contact with the lamellae, attached a little above the center of the stipe.

Type collected on partly shaded soil in a yam patch in Troy and Tyre, Jamaica, January 12-14, 1909, *W. A. Murrill & W. Harris* 953. This attractive species much resembles *Pholiota*, but its spore characters place it in *Stropharia*. It was found but once. Colored drawings of young and mature stages were made by Mrs. Murrill.

2. *STROPHARIA FLOCCOSA* Earle, Inf. An. Estac. Centr. Agron. Cuba 1: 241. 1906

Described from several collections in the vicinity of Santiago de las Vegas, Cuba. It occurs on the ground and is usually clustered, having the appearance of *Hypholoma*. It has not been collected elsewhere.

3. *Stropharia caespitosa* sp. nov.

Pileus fleshy, rather thin, campanulate to convex, cespitose, 3-5 cm. broad; surface dry, pallid with brownish shades, floccose-scaly, at length glabrous, rugose; margin thin, fluted, scarcely striate; context white with mild, pleasant flavor; lamellae adnexed, crowded, rather narrow, white to pale-purplish-brown; spores generally smooth, ellipsoid, rounded at both ends, decidedly purplish-brown under the microscope, $6-7 \times 3.5-4 \mu$, but also quite often oblong-ellipsoid or oblong-ovoid, uniguttulate, $10-12 \times 5 \mu$; stipe subcylindric, tapering below, white, densely floccose, hollow, 7-10 cm. long, 5-10 mm. thick; veil white, thick, usually forming a more or less deciduous annulus about 3 cm. from the apex of the stipe.

Type collected by Van Herman in red clay soil under a house at Santiago de las Vegas, Cuba, September 16, 1904, *F. S. Earle* 204. Known only from the type locality. This species resembles the annulate form of *Drosophila appendiculata*.

4. *STROPHARIA SEMIGLOBATA* (Batsch) Quél. Champ. Jura Vosg.
112. 1872

A widely distributed species, occurring on manure or manured ground. Patouillard reports it from Costa Rica and it probably occurs elsewhere in tropical America at high altitudes, but I have at hand very few collections from that region. At Cinchona, Jamaica, 5,000 feet elevation, I found the common, slender-stemmed form twice on horse manure (Nos. 561 and 638). The spores were ellipsoid, smooth, opaque, umbrinous under the microscope, reaching $18 \times 12 \mu$.

At the same place and on the same substratum, I found a larger form with thicker stipe and more slender spores (No. 449), which may be briefly described, as follows: pileus hemispheric to top-shaped, solitary, 3.5 cm. broad, 2 cm. thick; surface smooth, viscid, shining, nearly melleous; lamellae stramineous, soon colored by the spores, which are oblong-ellipsoid, smooth, opaque, of enormous size, umbrinous, $21 \times 9 \mu$; stipe cylindric, equal, smooth, viscid, shining, nearly melleous, 5 cm. long, 5 mm. thick; annulus glutinous, pale-yellowish.

5. *STROPHARIA CUBENSIS* Earle, Inf. An. Estac. Centr. Agron.
Cuba 1: 240. 1906

A large and handsome plant described from half a dozen collections in pastures and manured places about Santiago de las Vegas, Cuba. Earle remarks that it is the commonest Cuban species. Collected also in Porto Rico, *E. G. Britton & D. W. Marble* 748 and *Bruce Fink* 899, 1955; and in British Honduras, *Morton E. Peck*.

6. *Stropharia bermudensis* (Mass.)

Hypholoma bermudense Mass. Kew Bull. Misc. Inf. 1899: 184.
1899.

Described from specimens collected on the ground at St. George's, Bermuda, by Cummins and said to be allied to *Stropharia aeruginosa* but distinguished by its thin pileus and coarsely serrate gills. The pileus is smooth, pale-ochraceous, aeruginous

toward the margin, viscid, 3-4 cm. broad; spores $7 \times 5 \mu$; stipe whitish, glabrous above the annulus, squamulose below, 3-4 cm. long.

DOUBTFUL SPECIES

Stropharia melasperma (Bull.) P. Karst. Bidr. Finl. Nat. Folk 32: 489. 1879. Reported from Costa Rica by Patouillard.

Stropharia stercoraria (Fries) Quél. Champ. Jura Vosg. III. 1872. Probably confused with *S. semiglobata* in tropical America, as it is elsewhere.

12. AGARICUS L. Sp. Pl. 1171. 1753

Pratella S. F. Gray, Nat. Arr. Brit. Pl. 1: 626. 1821.

Psalliota Quél. Champ. Jura Vosg. 107. 1872.

This genus, distinguished among brown-spored gill-fungi by a fleshy stipe, free lamellae, and the presence of an annulus, has received much attention from mycologists because of the important edible species in it. The different species are usually not very well characterized, being much the same in shape and color and differing very little in spore characters. Moreover, the variations in some species are quite confusing. Judging from the wealth of material at hand, it would seem that the inhabitants of tropical America are fully as well provided with safe, appetizing food supplied by members of this genus as are their brothers farther north.

Species occurring on dead roots of bamboo 1. *A. bambusigenus*.
Species occurring among humus in woods or thickets.

Pileus grayish with brown scales; stipe 4 mm. thick. 2. *A. angustifolius*.

Pileus fawn-colored with reddish shades; stipe 8 mm. thick 3. *A. subsilvicola*.

Pileus brownish, darker brown on the rounded umbo; stipe 5-7 mm. thick 4. *A. Johnstonii*.

Pileus purplish-incarnate or rose-colored.

Pileus 5 cm. broad 5. *A. cinchonensis*.

Pileus 10 cm. broad 6. *A. Venus*.

Species occurring in grass on lawns or in fields.

Pileus white, without squamules.

Annulus simple 7. *A. campester*.

Annulus of two parts, radially split below 8. *A. pratensis*.

Pileus white or yellowish, with brownish squamules.

Pileus 5-10 cm. broad 7. *A. campester*.

Pileus 10-18 cm. broad.

Surface pure-white, with a few brownish scales 9. *A. subpratensis*.

Surface dirty-white or yellowish, with numerous scales 10. *A. praemagnus*.

Pileus reddish, umbrinous on the disk 11. *A. jejunus*.

Species occurring in cultivated or exposed soil, manure heaps, rubbish, etc.

Pileus 3-6 cm. broad.

Stipe 2.5 cm. long 12. *A. harradurensis*.

Stipe 4-6 cm. long.

Surface white 13. *A. Earlei*.

Surface pale-chestnut 14. *A. xuchilensis*.

Pileus 6-8 cm. broad, white with ochraceous disk 15. *A. ochraceidiscus*.

Pileus 10 cm. or more broad.

Surface decorated with small scales 16. *A. Hornei*.

Surface decorated with large scales.

Surface scaly at the center only; spores

$11 \times 8 \mu$ 17. *A. guadelupensis*.

Surface scaly all over; spores $5 \times 3.5 \mu$ 18. *A. Shaferi*.

1. *Agaricus bambusigenus* Berk. & Curt. Jour. Linn. Soc. 10: 291. 1868

Described from three collections by Wright in Cuba, where it was found growing in thick clusters on dead roots of bamboo. The pileus is convex to plane, umbonate, reddish, squamulose; stipe squamulose, white, 8 cm. long; spores ellipsoid, smooth, often obliquely papillate at the base, dark-purplish-brown, uniguttulate, mostly $4.5 \times 2.5 \mu$, a few reaching $6 \times 4 \mu$; annulus superior, ample. The type specimens at Kew resemble *A. Earlei*, but the surface is more imbricate-squamulose, with dark umbo, and the stipe twice as long.

2. *Agaricus angustifolius* sp. nov.

Pileus thin, convex to expanded, gregarious, 4-6 cm. broad; surface dry, grayish with brown scales, brown on the disk; margin entire, concolorous; context thin, whitish, with mild taste; lamellae free, much crowded, narrow, bright-pink to brown; spores ellipsoid, smooth, obliquely apiculate at the base, rather pale purplish-brown with a yellowish tint under the microscope, uniguttulate, $5-5.5 \times 2.5-3 \mu$; stipe cylindric, glabrous, pallid, hollow, 6 cm. long, 4 mm. thick; annulus ample, attached very near the apex of the stipe.

Type collected on the ground in moist woods at Rose Hill, Jamaica, 1,200 m. elevation, October 30, 1902, *F. S. Earle* 287. Known only from the type locality. This is one of the slender species of the genus, with thin pileus, very narrow, crowded lamellae, and slender stipe. It is not related, however, to *Lepiota*.

3. *Agaricus subsilvicola* sp. nov.

Pileus thin, expanded, solitary, 8 cm. broad; surface subglabrous, moist or subviscid, smooth, not striate, fawn-colored or pallid with reddish shades, darker on the disk; margin entire, concolorous; context pallid with a reddish tint, the flavor peculiar, subaromatic and unpleasant; lamellae free, rather narrow, crowded, dark-pink to brown; spores ellipsoid, smooth, often indistinctly obliquely apiculate at the base, rather pale purplish-brown with a yellowish tint under the microscope, 1-2-guttulate, $5 \times 2.5-3 \mu$; stipe cylindric, slightly enlarged at the base, brownish and silky above the annulus, whitish and fibrillose below, solid, firm, tough, 8-10 cm. long, 8 mm. thick; annulus ample, white, persistent, conspicuously floccose below, distant 1-2 cm. from the apex of the stipe.

Type collected at Cinchona, Jamaica, 1,500 m. elevation, November 2, 1902, *F. S. Earle* 380. Also collected on the ground in moist woods at Rose Hill, Jamaica, 1,200 m. elevation, October 30, 1902, *F. S. Earle* 288. This species resembles *Agaricus silvicola* in shape and size but differs somewhat in color, taste, etc., and the spores are considerably smaller.

4. *Agaricus Johnstonii* sp. nov.

Pileus thin, convex to expanded, umbonate, becoming somewhat depressed with age, solitary or gregarious, 5-7 cm. broad; surface dry, squamulose, brownish, darker brown on the rounded umbo, becoming bay-brown throughout on drying; margin entire, concolorous; lamellae free, crowded, somewhat ventricose, dull-chocolate-brown at maturity; spores ellipsoid, smooth, indistinctly obliquely papillate at the base, rather dark purplish-brown under the microscope, 1-2-guttulate, $4.5 \times 2.5 \mu$; stipe subcylindric, slender, smooth, fibrous-stuffed, whitish, becoming brownish in old specimens, 7-9 cm. long, 5-7 mm. thick; annulus prominent, membranous, persistent, white, attached near the apex of the stipe.

Type collected in humus in woods at Rio Piedras, Porto Rico, June 11, 1914, *J. R. Johnston* 1945. Also collected in the same vicinity on humus in December, *J. R. Johnston* 135, 3485.

5. **Agaricus cinchonensis** sp. nov.

Pileus convex to nearly plane, somewhat umbonate, gregarious, 5 cm. broad, 1 cm. thick; surface purplish-incarnate, fibrillose, fulvous on the umbo; margin undulate, concolorous; lamellae free, crowded, ventricose, salmon-pink; spores ovoid or ellipsoid, smooth, distinctly obliquely papillate at the base, dark-purplish-brown, opaque, $4-5 \times 3.5 \mu$; stipe subequal except at the enlarged base, nearly smooth, griseous, 5 cm. long, 8 mm. thick; annulus white, membranous, persistent, attached near the middle of the stipe.

Type collected on the ground in a thicket at the edge of a field at Cinchona, Jamaica, 1,500 m. elevation, December 25, January 8, 1908-9, *W. A. & Edna L. Murrill* 444. Known only from the type locality.

6. **Agaricus Venus** sp. nov.

Pileus convex to plane or slightly depressed, regular, rather thin, solitary, 10 cm. broad; surface mostly rose-colored, melleous in some places, imbricate-fibrillose, castaneous and rimose on the disk; margin straight, concolorous, not striate; lamellae free, crowded, ventricose, salmon-pink; spores oblong-ellipsoid, smooth, obliquely apiculate at the base, purplish-brown, opaque, $5-6 \times 3-3.5 \mu$; stipe smooth and griseous above, white with chestnut blotches and scales below, conspicuously bulbous, 8 cm. long, 1.2-2.5 cm. thick; annulus large, membranous, simple, white, attached about the middle of the stipe.

Type collected on the ground under tree ferns at Morce's Gap, Jamaica, 1,500 m. elevation, December 29, 30, January 2, 1908-9, *W. A. & Edna L. Murrill* 749½. Known only from the type locality. This very beautiful species was discovered by Mrs. Murrill, who made a colored drawing of it.

7. **AGARICUS CAMPESTER** L. Sp. Pl. 1173. 1753

This common temperate species does not appear to be at home in the tropics, at least in its typical form in the wild state.

Patouillard reports it from Brazil and Guadeloupe and Léveillé from Mexico, while specimens from Santo Domingo were so labeled by Berkeley at Kew. Two collections were recently brought in from Bermuda, which is not altogether tropical territory, by *Brown, Britton & Seaver* 1390, 1513. Some of the numerous varieties of this species may well occur in heavily manured cultivated ground in tropical regions. A note made by me at Hope Gardens, Jamaica, January 9, 1909, reads, as follows: "*A. campester* on the lawns in Hope Gardens very abundant last week, according to Mr. Harris, but invariably small."

8. *Agaricus pratensis* Scop. Fl. Carn. ed. 2. 2: 419. 1772

Agaricus arvensis Schaeff. Fung. Bavar. 4: 73. pl. 310, 311. 1774.

The horse mushroom is abundant in temperate regions, where it is extensively collected for food. Patouillard has it in his herbarium from Oaxtepec, Mexico, collected by Paul Maury. There are at hand two recent collections from Bermuda by *Brown, Britton & Seaver* 1347, 1512. See *A. subpratensis*.

9. *Agaricus subpratensis* sp. nov.

Pileus globose to convex, very thick and fleshy, growing in large circles, reaching 10 cm. or more broad; surface dry, white, cottony, with scattered, brownish, imbricate scales; margin white, thick; lamellae free, crowded, rather narrow, pink to blackish-brown; spores broadly ovoid, smooth, conspicuously obliquely papillate at the base, with a very large nucleus, purplish-brown with a slightly yellowish tint under the microscope, $8 \times 5 \mu$; stipe short, thick, tapering upward from a swollen base, white, fibrillose, solid, 5-8 cm. long, 2 cm. or more thick; annulus thick, membranous, white, persistent, attached near the apex of the stipe.

Type collected on the golf links at Constant Spring Hotel, Kingston, Jamaica, January 9-10, 1909, W. A. Murrill 824. Known only from the type locality. This species resembles *A. pratensis* both in appearance and habit but is conspicuously squamulose and has a shorter stipe.

10. *Agaricus praemagnus* sp. nov.

Pileus large, thick and fleshy, convex to expanded, gregarious to cespitose, 12-18 cm. broad; surface avellaneous to dirty-white or yellowish, with minute, appressed, avellaneous or brownish scales, the disk concolorous or very slightly darker; margin thin, not striate, pallid, exceeding the lamellae; context white, with pleasant, nutty flavor, and sometimes a faint odor of prussic acid; lamellae free, densely crowded, rather narrow, plane, pure-white, becoming dirty-pink and at length coppery-brown to black; spores rather broadly ellipsoid, rounded at both ends, smooth, often obliquely apiculate at the base, decidedly purplish-brown under the microscope, opaque, rather variable in size, $6-7 \times 3.5-4.5 \mu$; stipe subcylindric, very slightly enlarged at the base, dirty-white, staining when handled, somewhat pruinose, fistulose, 10 cm. long, 2 cm. thick; annulus very large, membranous, tough, persistent, white above, brownish-floccose below, distant 1-2 cm. from the apex of the stipe.

Type collected in grass near manure heaps at Santiago de las Vegas, Cuba, May 13 and 15, 1904, F. S. Earle 18. Also collected on a manure pile at the edge of a lawn at Chester Vale, Jamaica, 900 m. elevation, December 21-24, 1908, W. A. & Edna L. Murrill 265; and at Knutsford Park, Kingston, Jamaica, January 9, 1909, W. A. Murrill 827.

11. *AGARICUS JEJUNUS* Fries, Nova Acta Soc. Sci. Upsal. III.**I: 24. 1851**

Described and known only from specimens collected in the Antilles, said to be growing with *A. campester* and *A. pratensis*. Pileus gibbous, 6 cm. or more broad; surface reddish, appressed-pilose-squamulose, smooth and umbrinous on the disk; lamellae very much crowded; stipe enlarged at the base, tapering upward, white, 7.5 cm. long; annulus lacerate, evanescent.

12. *Agaricus herradurensis* sp. nov.

Pileus thin, cylindric to broadly convex, discoid at the center, solitary, 3 cm. broad; surface dry, reddish-brown, the pellicle rupturing and forming upturned floccose squamules, the disk dark-brown; margin pallid, entire, not striate; lamellae free, crowded, rather broad, dark-reddish-brown at maturity; spores

broadly ellipsoid, smooth, indistinctly obliquely papillate at the base, rather dark purplish-brown under the microscope, opaque, uniguttulate, $4-4.5 \times 2.5 \mu$; stipe cylindric, glabrous, white, hollow, 2.5 cm. long, 4 mm. thick; annulus delicate, white, attached very near the base of the stipe.

Type collected in soil in a garden at Herradura, Cuba, August 31, 1907, F. S. Earle 575. Known only from the type locality. This is a very small species, with reddish-brown pileus, short, white stipe, and basal annulus.

13. *Agaricus Earlei* sp. nov.

Pileus rather thin, ovoid to convex and finally expanded, gregarious, 3-6 cm. broad; surface white, brownish on the disk, decorated with small appressed or somewhat verrucose, brownish scales; margin whitish, not striate; context white, unchanging, without odor but with pleasant taste; lamellae free, crowded, rather broad, subventricose, pink to dark-coppery-brown; spores ellipsoid, indistinctly obliquely apiculate at the base, smooth, opaque, purplish-brown under the microscope, dark-brown in mass, uniguttulate, $5 \times 3 \mu$; stipe cylindric, abruptly discoid-bulbous at the base, pure-white, glabrous, stuffed to hollow, 4-6 cm. long, 5-10 mm. thick; annulus membranous, persistent, becoming movable, white, distant 1 cm. from the apex of the stipe.

Type collected in red clay soil in a banana field at Santiago de las Vegas, Cuba, May 17, 1904, F. S. Earle 33. Also collected by Earle in the same field, June 18 and 21, 1904.

14. *Agaricus xuchilensis* sp. nov.

Pileus convex to nearly plane, not umbonate, solitary, 4.5 cm. broad; surface pale-chestnut, smooth, with innate, appressed, imbricate fibrils; margin entire, concolorous; lamellae free, sub-crowded, rather narrow, pallid when young and fresh, becoming blackish-brown; spores oblong-ellipsoid, smooth, distinctly obliquely papillate at the base, dark-purplish-brown to blackish under the microscope, opaque, uniguttulate, $5 \times 2.5 \mu$; stipe slightly tapering upward, not bulbous, much paler than the pileus but similarly colored, smooth, 5 cm. long, 7 mm. thick; annulus small, membranous, persistent, white, fixed a little above the middle of the stipe.

Type collected in a rich field at the edge of a forest at Xuchiles, near Cordoba, Mexico, January 17, 1910, *W. A. & Edna L. Murrill 1156*. Known only from the type locality. This species may be readily recognized by its very dark pileus and pale lamellae.

15. *Agaricus ochraceidiscus* sp. nov.

Pileus fleshy, firm, convex to expanded, subcespitoso, 6-8 cm. broad; surface dry, white, with ochraceous scales, ochraceous on the disk; context white, unchanging, with sweetish taste; lamellae free, crowded, moderately broad, ventricose, dark-grayish-lilac with reddish stains; spores quite broadly ellipsoid, smooth, opaque, decidedly purplish-brown under the microscope, rounded at both ends, $4.5-5 \times 3-3.5 \mu$; stipe tapering upward, white, floccose, solid but somewhat spongy within, 5-7 cm. long, 6-12 mm. thick; annulus white, sometimes fugacious, distant 1 cm. from the apex of the stipe.

Type collected in red clay on a ditch bank at Santiago de las Vegas, Cuba, September 28, 1904, *F. S. Earle 265*. Also collected in the same vicinity in the autumn of 1904 and 1905, *F. S. Earle 297, 350, 379*.

16. *Agaricus Hornei* sp. nov.

Pileus convex, firm, solitary, reaching 10 cm. broad; surface dry, whitish, with small, brownish, imbricate, fibrillose scales; margin even, somewhat appendiculate; context white, unchanging, without odor and without characteristic taste; lamellae free, crowded, of medium breadth, pink to reddish-brown, not becoming black; spores broadly ellipsoid, smooth, opaque, obliquely apiculate at the base, decidedly purplish-brown, uniguttulate. $5.5 \times 4 \mu$; stipe deeply buried but not radicate, irregularly enlarged and swollen below, silky-shining and slightly floccose above, brownish-white, spongy and hollow within, 15 cm. long, 2-3 cm. thick; annulus thick, membranous, white, persistent, distant 1 cm. from the apex of the stipe.

Type collected in soil in a field in rather dry weather at Heradura, Cuba, December 25, 1907, *F. S. Earle and W. T. Horne 579*. Known only from the type locality.

17. *Agaricus guadelupensis* Pat. Bull. Soc. Myc. Fr. 15:
197. 1899

Described from specimens collected by Duss on the ground among rubbish near dwellings in Guadeloupe. The description seems to place it midway between *Agaricus* and *Lepiota*. I have not examined the type specimens.

18. *Agaricus Shaferi* sp. nov.

Pileus convex to expanded, solitary, 10 cm. or more broad; surface dry, whitish or pale-yellowish, densely covered with conspicuous, light-brown scales; margin entire, concolorous; lamellae free, rather crowded, blackish-brown at maturity; spores broadly ellipsoid, smooth, opaque, dark-purplish-brown under the microscope, $5 \times 3.5 \mu$; stipe tall and thick, enlarged at the base, whitish, fibrillose, 15 cm. long, 3-4 cm. thick; annulus ample, membranous, white, persistent, attached very near the base of the stipe.

Type collected in soil near Laguna Herradura, Pinar del Rio, Cuba, December 12, 1911, J. A. Shafer 11269. Known only from the type locality. This species is readily distinguished by its large size and conspicuously scaly surface. Unfortunately, the collector pressed his specimens flat and made very brief notes; but it would seem a pity not to recognize such a splendid plant.

DOUBTFUL AND EXCLUDED SPECIES

Agaricus Sallei Berk. Ann. Mag. Nat. Hist. II. 9: 193. 1852. Known only from specimens collected on dead wood in Santo Domingo by Sallé. It is described as acutely umbonate, with minute, branlike scales, 8 cm. broad; stipe 10 cm. long and 5 mm. thick, spores broadly ellipsoid, nearly straight on one side, purple-brown, $11 \times 8 \mu$. Berkeley thought it was a species of *Lepiota* before he examined the spores. The fact that it grew on dead wood and was acutely umbonate would indicate that it hardly belonged to *Agaricus*. No mention is made of striations on the surface.

Agaricus yucatanensis Ellis & Ev. Field Columb. Mus. Bot. ser. 1, 285. pl. 8. 1896. Described from specimens collected on

decaying vegetable matter in Yucatan by Millspaugh in 1895. Ellis remarked that it had the appearance of a *Lepiota* but that the spores were brown. A microscopic examination of the type shows the spores to be ovoid, smooth, slightly obliquely apiculate at the base, hyaline with a distinctly melleous tint, granular, $9 \times 5 \mu$. This agrees very well with the characters of the spores of *Lepiota cretacea*, except for color, while in general appearance the two species are not very distinct. It is well known that some species of *Lepiota* have darkened spores.

13. *COPRINUS* Pers. Tent. Disp. Fung. 62. 1797

This genus is readily distinguished among the black-spored gill-fungi by its deliquescing lamellae. As at present constituted, it includes a large and heterogeneous group of species, which fall naturally into three or more groups. Professor Earle has collected a large number of specimens in Cuba, most of them of the general type of *C. plicatilis* and *C. Spraguei*, representing the genus *Coprinopsis* of Karsten, a segregate of *Coprinus*, which dry more readily than the more fleshy species usually found by collectors.

No attempt will be made now to segregate the genus nor to study fully the material at hand. This will be left for Professor Pennington, who has undertaken to monograph the genus for *North American Flora*.

| | |
|---|-----------------------------|
| Pileus entirely white; stipe 2.5-4 cm. long | 1. <i>C. cubensis</i> . |
| Pileus whitish, but differently colored on the disk; stipe 5-8 cm. long. | |
| Disk fulvous | 2. <i>C. fimetarius</i> . |
| Disk cinereous | 3. <i>C. armillaris</i> . |
| Pileus pale-yellowish-white, somewhat darker on the disk; stipe only 2 cm. long | 4. <i>C. jalapensis</i> . |
| Pileus rose-colored, very small | 5. <i>C. mexicanus</i> . |
| Pileus griseous, murinous, or fuliginous. | |
| Stipe 1 cm. long | 6. <i>C. jamaicensis</i> . |
| Stipe 3-4 cm. long | 7. <i>C. cinchonensis</i> . |
| Stipe 5-7 cm. long | 8. <i>C. Spraguei</i> . |

1. *COPRINUS CUBENSIS* Berk. & Curt. Jour. Linn. Soc. 10: 293.
1868

Described from specimens collected by Wright on logs in Cuba. The pileus is conic-ovoid, white, floccose-squamulose, 4 cm. broad; lamellae free, crowded, purplish-brown; spores not black, but rather of a purplish-brown tint, boat-shaped as in *C. micaceus*; stipe larger below, glabrous, 2.5-4 cm. long, 3 mm. thick.

2. *COPRINUS FIMETARIUS* (L.) Fries, Epicr. Myc. 245. 1838
Agaricus fimetarius L. Sp. Pl. 1174. 1753.

This species is abundant in temperate regions, especially on manure heaps.

Jalapa, Mexico, *W. A. & Edna L. Murrill* 34. These specimens were collected on horse manure. The spores are broadly ovoid or subglobose, apiculate, smooth, black, $12-13 \times 7-8 \mu$.

3. *COPRINUS ARMILLARIS* Fries, Nova Acta Soc. Sci. Upsal. III.
1: 28. 1851

Described from specimens collected by Oersted in the island of St. Thomas. Two very pretty colored drawings, which strongly suggest *Lepiota*, are to be found at Copenhagen, but no specimens. No reference is made by Fries to the spores.

4. *Coprinus jalapensis* sp. nov.

Pileus campanulate to broadly convex, not fully expanding, thin, solitary, 2 cm. broad; surface smooth, glabrous, striate, pale-yellowish-white, somewhat darker on the disk; margin entire, concolorous, becoming ragged with age; lamellae free, narrow, crowded, gray to blackish-brown, whitish on the edges in young stages and showing under a lens large white cystidia on the sides; spores ellipsoid, somewhat irregular in outline, smooth, purplish-brown, $6-7 \times 4-5 \mu$; stipe tapering upward, smooth, glabrous, glistening-white, much enlarged at the base and attached to a conspicuous mass of reddish-brown mycelium, 2 cm. long, 2 mm. thick at the middle; annulus wanting.

Type collected on dead wood in woods at Jalapa, Mexico, 1,500 m. elevation, December 12-20, 1909, *W. A. & Edna L.*

Murrill 88. Known only from the type locality. This species has the appearance of *Coprinus* in the fresh state but the lamellae do not deliquesce readily. The cystidia and mass of ozonium also place it in *Coprinus*, although the dried specimens look very much like *Hypholoma*.

5. *Coprinus mexicanus* sp. nov.

Pileus obovoid to conic, expanding and deliquescing with age, having the appearance of a puffball when young, gregarious to cespitose, about 1 cm. broad and high before expanding; surface pale-incarnate when young, decorated with tufts of fibrils, becoming roseous and losing most of the fibrils with age; margin concolorous, becoming revolute; lamellae numerous, very narrow, blackish-brown at maturity; spores minute, ovoid, smooth, very pale purplish-brown, almost hyaline under the microscope, $4-4.5 \times 2.5-3.5 \mu$; stipe short, equal, somewhat fibrillose, white, 2-3 cm. long, 2 mm. thick; annulus membranous, persistent, rose-colored, attached below the middle of the stipe.

Type collected in abundance on the base of a dead, moss-covered trunk in a virgin forest at Motzorongo, near Cordoba, Mexico, 400 m. elevation, January 15, 1910, *W. A. & Edna L. Murrill 1080*. Known only from the type locality. This beautiful little species when first seen at a distance was thought to be a tiny puffball. Its rosy color and small size should readily distinguish it.

6. *Coprinus jamaicensis* sp. nov.

Pileus nearly cylindric to expanded, finally upturned and mostly deliquescing, gregarious to cespitose, 3 cm. high unexpanded, and 2 cm. broad at maturity; surface shaggy with pointed, fugacious scales, murinous, the scales fuliginous; margin striate after the scales fall away, as in *C. atramentarius*; lamellae rather crowded at first, ventricose, fuliginous, soon deliquescing; spores ovoid, smooth, nearly opaque, usually 2-guttulate, umbrinous under the microscope, $7-8 \times 4 \mu$; stipe equal, smooth, white, rather tough, hollow, 1 cm. long, 1.5 mm. thick; annulus wanting.

Type collected on a decayed palm trunk at Castleton Gardens, Jamaica, December 14, 1908, *W. A. & Edna L. Murrill 115*. Known only from the type locality.

7. *Coprinus cinchonensis* sp. nov.

Pileus very delicate, conic, becoming campanulate, solitary, 2 cm. broad and 7 mm. high; surface gray, pulverulent, griseous with isabelline patches on the disk; margin thin, long-striate, becoming revolute with age; lamellae free or slightly adnexed, tapering behind, ventricose in front, crowded, becoming very dark brown and deliquescent at maturity; spores ovoid or broadly ellipsoid, smooth, purplish-brown, mostly 2-guttulate, $9-11 \times 5-6 \mu$; stipe subequal, smooth, glabrous, snow-white, 3.5 cm. long, 2 mm. thick at the base and 1 mm. at the apex; annulus wanting.

Type collected on a dead log at Cinchona, Jamaica, 1,500 m. elevation, December 25-January 8, 1908-9, *W. A. & Edna L. Murrill* 579. Known only from the type locality.

8. *COPRINUS SPRAGUEI* Berk. & Curt. Ann. Mag. Nat. Hist. III.
4: 292. 1859

This species was described from plants collected on the ground in New England by Sprague. Berkeley reports it among Wright's collections in Cuba and remarks that the spores are smaller than those of *C. plicatilis* and of different shape.

14. *CLARKEINDA* O. Kuntze, Rev. Gen. 2: 848. 1891
Agaricus § *Chitonia* Fries, Hymen. Eur. 277. 1874.
Chitonia P. Karst. Bidr. Finl. Nat. Folk 32: 482. 1879. Not
Chitonia Moc. & Sesse, 1824.

This genus is distinguished from all the other Agaricaceae by the presence of a volva. It contains very few species and none of them are known to occur in tropical North America.

NEW YORK BOTANICAL GARDEN.

NEW JAPANESE FUNGI

NOTES AND TRANSLATIONS—IV

TYŌZABURŌ TANAKA

BOTRYTIS LILIORUM Y. Fujikuro sp. nov. in *Shokubutsu-gaku Zasshi* (Bot. Mag.) *Tōkyō*, **28**³²⁰: 228–230, 1 fig. T. 3, v, May, 1914.

Mycelia hyaline, branching, $3\text{--}12\ \mu$ across, septate and granulate inside; conidiophores projecting from the stomata of the host; solitary or two together, dark-brown in color, gradually paler toward the outer ends and nearly hyaline at the tips, $490\text{--}780 \times 16\text{--}21\ \mu$, provided with 3–4 deciduous branchlets, which are sometimes dichotomously divided at the ends; conidia 4–6 to a branchlet, pale-gray, smooth, ovoid, broadly ovoid, or nearly spherical, sometimes irregularly shaped, $28\text{--}37 \times 21\text{--}31\ \mu$, averaging $32 \times 27\ \mu$, with granules $2\text{--}3\ \mu$, germinating at the apex or lateral surface with 1–2 germination tubes $6\text{--}9\ \mu$ diam.

On *Lilium longiflorum* Thunb.

Type locality: Taikazeiho, Taihoku-chō, Formosa (Agr. Exp. Sta. farm).

Illustrations: One halftone text-figure showing hyphae, conidiophores, and conidia.

The author compared this fungus with others of the same genus, reported as attacking the lily plant (*Botrytis canescens* and the *Botrytis* form of *Sclerotinia parasitica*), but could not find any similarity, so he described it as a new species.

Discovered by the author at the experiment farm of the Taiwan (Formosa) agricultural experiment station, among plants sent from Lüchū Island. The disease, according to the author's statement, is as bad as any other three lily diseases ever found in Japan. It affects the plant mostly on the leaves, first appearing as small spots about 1 mm. diam., immediately spreading all over the surface, causing the total decay of the host plant. The

reproductive organs of the fungus appear on the decayed portion of the plant, giving it an appearance of powdery, fine fur.

PHYLLOSTICTA (PHOMA) KUWACOLA K. Hara sp. nov. in Dainippon Sanshi Kwaisho (Journ. Sericultural Association of Japan), Tôkyô, 26³⁰⁴: 390-391, T. 6, v, May 1917. (Japanese.)

Spots amphigenous, first minute (the size of *Sesamum* seeds), brownish, then increasing in size to 6-12 mm. diam., circular or polygonal, sometimes irregular, rufous, finally cinereous with concentric zones and determinate margins, punctate with minute black dots, mostly appearing on the upper surface of the spots; pycnidia sphaeroid or depressed sphaeroid, at first buried in the matrix, finally sub-emergent, dark-brown, 60-100 μ diam.; wall fungoid-parenchymatous, cells 5-10 μ diam.; ostiola slightly prominent or mammillate, later perforate; pycnospores numerous, ellipsoid, ovoid, cylindric or sub-fusoid, both ends rounded, nuculate at both ends but sometimes not, hyaline, 4-6 \times 2-3 μ ; sterigmata obsolete.

On living leaves, shoots and twigs of *Morus alba*.

Localities: Mino (Gifu-ken) and adjacent prefectures—the annual damage seems to be considerable.

The spots appear on the leaves and then gradually dry up, becoming lacerate in dry weather and rotting in rainy weather. When they appear on the margins of leaves, very frequently semi-circular holes are made; when two or more are formed close together they coalesce, becoming irregular spots which sometimes occupy considerable space on the leaf and cause the entire blade to decay. Young twigs are also attacked and quickly change to a brownish color and die, showing minute black pustules over the surface. Hard twigs when attacked by the fungus display rufous spots which later become blackish and sink considerably below the level, showing much roughness and cracking on the surface and finally causing the death of the upper part of the twig.

New Japanese name of the disease: Kuwa no Rinmonbyô (circle blotch of mulberry).

Phoma Mororum Berl. is the nearest to this species, but the pycnospores in the former species are curved while in *P. Kuwa-*

cola they are straight, and the details of pycnidial structure differ greatly in the two species.

SEPTOBASIDIUM ACACIAE Sawada sp. nov., in Nôji Shikenjô Tokubetsu Hôkoku (Special Report, Agr. Exp. Station) Taiwan (Formosa), no. 2: 103-104, pls. 11, 12. M. 44, xi, Nov. 1911. (Japanese.)

Mycelial strands (pilea) filamentous, rigid, tightly adhering to the bark, effused, 10 cm. across, 70-180 μ thick; surface smooth, brown or tobacco-brown when dry, brunneous when wet; margin grayish-white; hyphae yellowish-brown when mature, branched, septate, 3 μ in diam.; protobasidia appearing on superficial hyphae, spherical, colorless, finely guttulate, subsessile, 9-15 μ across; basidia rising from protobasidia, easily detached, cylindric, subacute above and truncate below, straight or slightly curved, hyaline, 1-5-septate, 52-81 \times 4-6 μ ; sterigmata from each cell of basidia, 4-12 μ long; basidiospore hyaline, oblong to oblong-ovoid, curved, 18-22 \times 3-6 μ , germinating with short tubes carrying sporidia of about the same appearance as basidiospores measuring 11-15 \times 3-5 μ .

On trunks and twigs of *Acacia Richii*.

Type locality: Taihokuchô Shakukô, Formosa, Sept. 26, 1910, K. Sawada and Y. Fujikuro; l. c. Oct. 7, 1910, Y. Fujikuro.

Additional hosts and localities: On *Glochidion obovatum* (Euphorbiaceae), Agr. Exp. Station ground, Taihoku-chô Taikazeiho, Formosa, Oct. 7, 1910, Y. Fujikuro; on *Citrus* sp. Taihoku-chô Kiirun, Mar. 28, 1911, K. Sawada.

Illustrations: One halftone plate showing diseased twigs of *Acacia* and *Glochidion*; one black and white lithographic plate with 16 figures showing detailed structure of the fungus.

NOTE: It has been further reported by K. Sawada (in Nôji Shikenjô Tokubetsu Hôkoku, Taiwan, No. 11, Feb. 1915) that this fungus also occurs in Formosa on *Prunus Persica* (peach), *Prunus salicina* (plum), *Thea sinensis* (tea plant), *Salix glandulosa* var. *Warburgii*, and *Melia Azedarach*.

The affection is closely related to the attack of scale insects, and in many cases the dead insects were found embedded in the mycelial strands. The fungus sometimes kills *Acacia* trees

as was discovered by a forest inspector, so immediate treatment is desirable.

For the purpose of washing off the fungus, concentrated wood-ash solution (30-50 per cent.) is recommended.

CERCOSPORA PINI-DENSIFLORAE Hori et Nambu sp. nov. ex Viscount N. Nambu in *Byōchū-gai Zasshi* (Journ. Plant Protection, Tōkyō, 5⁵: 353-354. T. 6, v, May 1917. (Japanese.)

Acervuli punctiform, minute, black; conidiophores projecting from stromata, grouped, dark-brown, about 44μ high, 4.4μ across; conidia filiform or long-obclavate, slightly curved or straight, pale-yellow, 4-5-, sometimes 6-septate, $41.49-50.7 \times 1.23-4.6\mu$.

Hyphae pale-amber, intercellular; spots yellowish-brown, usually occurring on the upper half of the leaf; disease first starts from the upper part of the plant, gradually coming down, finally causing the death of all that portion of the plant above ground.

On leaves of young plants of *Pinus densiflora*.

Type locality: Nursery of Makago, Kagoshima-ken, Major Forest Office, September 20, 1915.

A great many young plants, mostly two years old, were fatally injured in the nursery above mentioned, which is located in the southern part of Kyūshū Island. The occurrence of this disease so far as reported seems to be only local but it seems likely to prove dangerous if it is not controlled by treatment of seedlings with Bordeaux mixture, as suggested by the writer.

HELICOBASIDIUM TANAKAE Miyabe, ex K. Sawada in *Shokubutsu-gaku Zasshi* (Bot. Mag.) Tōkyō, 26³⁰⁴: 102-105, 2 figs., M. 45, iv, Apr. 1912 (Japanese); in J. Matsumura, *Index Plantarum Japonicarum* (Teikoku Shokubutsu Meikwan) 1: 146, Mar. 1904. (Nom. nud.).

Stypinella Tanakae Miyabe, in K. Saida, *Naigwai Futsū Shokubutsushi* (Common flora of Japan and Foreign Lands) 1: 315. Aug. 1910 (Nom. nud.).

Septobasidium sp. M. Shirai in *Saikin Shokubutsu Byōrigaku* (Latest Plant Pathology), 3d ed., p. 356, Aug. 1907.

Mycelial strands (pilea) epigenous on trunks and twigs, first circular then increasing the area irregularly, often attaining 10 cm. diam., flat, lichenous, 1 mm. thick, surface velvety, brownish, pale-purplish-brown, or dark-brown, with very narrow thin margin grayish in color; hyphae branching, amber-colored, septate, thick-walled, granulate, in continuous row, 3-5 μ across; protobasidia not formed; basidia consisting of free branched ends of surface hyphae swollen and more or less club-shaped, first unicellular, hyaline and very granulate but at maturity sub-fusoid, 2-4-septate, straight or curved, 49-65 \times 8-9 μ , producing sterigmata on each cell; sterigmata apical in the terminal cell, lateral in others, long, curved, comparatively large, 35-63 \times 3.5-4 μ ; sporidia terminal on each sterigma, hyaline, unicellular, long-falcate, obtuse, 27-40 \times 4-6 μ , germinating to form hyphae.

On trunks and twigs of *Morus*, *Salix*, *Vitis*, *Juglans*, *Xanthoxylum*, *Prunus Mume*, *Prunus donarium*, *Prunus salicina*, *Prunus Armeniaca* var. *Ansu*, *Pyrus Malus*, *Pyrus sinensis*, *Ribes Grossularia*, *Kerria japonica*, *Thea sinensis*, *Paulownia tomentosa*, *Firmiana platanifolia*, and *Pittosporum undulatum*.

Distribution: Japan, very common.

Most Japanese authorities who have described this species have confounded it with *Septobasidium pedicellatum* (Schw.) Pat. but the true *S. pedicellatum* was first discovered in Formosa by Mr. Sawada (Bot. Mag., Tôkyô, 26³¹⁰: 307-311, Japanese) where *Helicobasidium Tanakae* does not occur. *Septobasidium pedicellatum* seems to attack only the mulberry tree and differs in having chestnut-brown hyphae 3.5 μ across, forming an ochre-brown pileus (never purplish), and in the formation of strongly curved basidia, 24-48 \times 6-8.5 μ , which develop from spherical protobasidia.

NOTE: For an account of the occurrence of *Septobasidium pedicellatum* in Honshû (Main Island), we are indebted to Prof. A. Yasuda, who reported it from Kôdzuke-no-kuni (Prefecture Gumma-ken) Setagun (Bot. Mag. Tôkyô, 28³³⁵: 447, Nov. 1914. Japanese). Hara later states that it occurs commonly in the main island (Dainippon Sanshi Kwaihô, Journ. Seric. Assoc. Japan, 25²⁹⁶: 713, Sept. 1916). It has also been collected by Miyake at a place near Tôkyô (Sangyô Shikenjô Hôkoku 1⁵: 333, Dec. 1916), and recently T. Watanabe reports that it is *S. pedicel-*

latum, not *Helicobasidium Tanakae*, which occurs on mulberry trees in the vicinity of Tôkyô (Sangyô Shimpô, Journ. of the Silk Industry, Tôkyô, 25²⁸⁷: 88, Feb. 1917).

The last paper mentioned gives an interesting account of the parasitic nature of both species, not merely epiphytically covering the surface of the host as reported before. The hyphae, rather finer, measuring $3\ \mu$ across, almost colorless, attack the outer layer of phellogen, entering mostly through complementary cells of lenticels, and there making conspicuous intracellular development, which is shown by penetrated cell-walls and well-nourished hyphae containing plenty of oil globules.

NO THOPATELLA MORICOLA I. Miyake sp. nov. in Sangyô Shikenjô Hôkoku (Technical Rept. Imperial Sericultural Exp. Station) Tôkyô, Japan, 1⁵: 344, pl. 17, figs. 15, 16, T. 5, xii, Dec. 1916. (Japanese.)

Pycnidia hypo-epidermal, conoid-pustulate, later erumpent, irregular, black; walls indefinitely pseudo-parenchymatous, not evidently differentiated from the matrix, forming pseudostromata, multilocular; ostiola simple, opening at the elevated portion of the pycnidia; conidia usually ellipsoid, rarely ovoid or elongate, nucleate with a comparatively large, greenish, oil-globule at each end, first colorless and hyaline, later olivaceous, unicellular, $2.7-3.8 \times 1.5-2.5\ \mu$; conidiophores covering the whole inner surface of pycnidia, abundant, hyaline, filiform, $10-14 \times 1\ \mu$.

On twigs of *Morus alba*.

Type locality: Iwate-ken, Morioka-shi, Apr. 5, 1915, I. Miyake.

Illustrations: Two lithographic figures showing pycnidium and conidia.

USTULINA MORI K. Hara sp. nov. in Dainippon Sanshi Kwaihô (Journ. of Sericultural Association, Japan), 26²⁰⁴: 389. May 1917. (Japanese.)

Stromata superficial, effused, 1-4 cm. in diam., 2-3 mm. thick, first carnose, later rigid, lacquer-black or dusky-black, whitish inside, sometimes more or less repand, surface uneven, punctate with black dots, margin more or less rounded; perithecia immersed, seriatelvately closely aggregated near the surface, ovoid, large,

1-1.2 mm., with punctiform ostiola, perforate; ascii cylindric or clavate, rounded above, long-pedicellate below, $110-140 \times 10-12 \mu$, octosporous, paraphysate; ascospores monostichous, ovoid, ellipsoid, or indefinitely fusoid, blunt, continuous, 1-2 nucleate, dark-colored, $7-10 \times 4-5 \mu$; paraphyses filiform, simple, longer than ascii, $1-1.5 \mu$ across.

On trunks of *Morus alba*.

Type locality: Mino (Gifu-ken prefecture), Kawakami-mura, April, 1913, K. Hara.

Differs from *Ustulina microspora* in the shape and dimensions of ascospores.

VALSA PAULOWNIAE Miyabe et Hemmi.

Besides the description in Japanese translated in *Mycologia* for May, 1917, two other descriptions of the fungus have been published by one of the authors, Dr. Hemmi. All three descriptions are marked "n. sp." The first article to be published with the original description of the fungus (in English) appeared in Sapporo Hakubutsu Gakukwai Kwaihō (Transactions of the Sapporo Natural History Society), 6²: 133-158, text-figs. 1-4, issued July 31, 1916. This article gives a full account in Japanese of the disease caused by this fungus and compares it with other similar diseases. The third and last of these articles is published in English in the Shokubutsu-gaku Zasshi (Botanical Magazine) Tōkyō, 36³⁵⁷: 304-313, text-figs. 1-4, issued Sept. 20, 1916. This article also gives a description of *Valsa Paulowniae* n. sp. in English. One of the figures (Fig. 4) in each of these articles gives the detailed microscopic structure of the fungus. The other three figures show effects of the fungus on Paulownia trees. Dr. Hemmi notes that the fungus was first collected in Aomori-ken in N. Honshū in August, 1903, by Mr. T. Nakamura and reported then as causing a very destructive disease of the "Kiri" tree. All three articles are of importance in throwing light on a very dangerous *Paulownia* disease of Japan which is analogous to chestnut blight in America, both in its swift destructive action and in causing the loss of timber much valued for cabinet-making.

BUREAU OF PLANT INDUSTRY,
WASHINGTON, D. C.

NEW SPECIES OF RUSSULA FROM MASSACHUSETTS

GERTRUDE S. BURLINGHAM

In October, 1916, Mr. Simon Davis sent me for examination and identification an interesting collection of *Russula* made in the vicinity of Stow and South Acton, Massachusetts. Twenty species were represented, including *R. fallax* Fr., *R. fragiliformis* Burl. (*R. fragilis* Fr.), *R. glauca* Burl., *R. heterophylla* Fr., *R. insignis* Burl., *R. integra* (L.) Fr., *R. pectinatoides* Pk., and *R. veternosa* Fr. Eight other species I have reserved for further study, either awaiting notes regarding some particular point should the same species appear another season, or comparison with European material. Four species, however, differ so much from any related European or American *Russula* that they seem entitled to rank as new species. All of these were accompanied with careful and complete field notes and spore prints, and the dried plants were in excellent condition and in sufficient quantity to give a good idea as to the possible variations.

***Russula Davisii* sp. nov.**

Pileus broadly convex, depressed in the center, becoming expanded with the margin drooping, up to 18 cm. broad; surface entirely Pinard-yellow, or tinged with dull-reddish on the margin, viscid when wet, with separable pellicle, pruinose when young, then glabrous; margin even, at least the striations not pronounced; context white, firm but brittle, mild without special odor; lamellae buff-yellow when developed, equal, forking near the stipe, venose-connected, pilose, narrowed at the inner end, adnexed to slightly decurrent, broad at the outer end, up to 13 mm. broad, subdistant; stipe more or less washed with bluish-pink, very slightly discoloring grayish or sordid, expanding at the apex, tapering downward, rather firm, spongy, becoming hollow, glabrous, up to 7 cm. long and from 2 to 3 cm. in diameter; spores ochraceous, ellipsoid, coarsely and abundantly echinulate, $10-12 \times 8.5-10 \mu$; cystidia 50μ or more long by 18μ wide.

TYPE LOCALITY: Stow, Massachusetts.

HABITAT: On damp ground under chestnut trees, solitary or gregarious, August 7 to September 22.

RELATIONSHIP AND CHARACTERISTICS: This species seems to be related to the Betulinæ group. The lamellæ do not discolor at all and the discoloring of the stipe is so slight that it might easily be overlooked, so that it does not seem to be related to the Decolorantes. It can easily be distinguished by the general yellow color of the pileus and the reddish stem. The flesh is nearly as compact as in some species of the Compactæ. The pruinose-pilose lamellæ forking at the inner end, and the unequal stipe with its slight discoloration are some of the characteristics which prevent its being considered a yellow form of *Russula alutacea* Fr.

***Russula disparalis* sp. nov.**

Pileus broadly convex, becoming expanded and depressed in the center, up to 5.5 cm. broad; surface buff-yellow near the margin, Apricot-yellow toward the center, Sandford's brown to Auburn or Hessian-brown on the disk, viscid when wet, with separable pellicle, pruinose, otherwise glabrous; margin striate and obsoletely tuberculate, inrolled until mature; context white, taste subacrid, odor not distinctive; lamellæ white, mostly equal but a few not long enough to reach to the stipe, adnexed and rounded next the stipe, rather broad, subcrowded; stipe white, equal, spongy, becoming hollow, glabrous, rugose, subflexuous to straight, up to 5.5 cm. long and 1.5 cm. in diameter; spores ochroleucous, broadly ellipsoid, uniguttulate, apiculate, minutely echinulate, $8.7-10 \times 6-7.5 \mu$, from 1.5 to 1.8 μ being taken up by the point at the apex of the spore.

TYPE LOCALITY: Stow, Massachusetts.

HABITAT: Under chestnut trees in damp ground near a swamp. Also under *Pteris aquilina*, *Osmunda cinnamomea*, *Osmunda regalis*, black and white birch, and alder. Found from August 4 to September 11.

RELATIONSHIP AND CHARACTERISTICS: This species belongs to the group Palustres. It may be recognized by the contrasting yellow margin and the dark-brown center, and the pure-white stipe. It is so different in appearance from other species of

Russula that I have given it the specific name "disparilis" or the unlike *Russula*.

***Russula pulchra* sp. nov.**

Pileus convex, becoming plane to slightly depressed in the center, up to 8 cm. broad; surface Nopal-red on the margin, scarlet-red next and scarlet on the disk, or peach-red except on the margin, viscid when wet with pellicle separable on the margin, pruinose for some time, all except the disk becoming areolate with age; margin tuberculate-striate, inrolled; context white, mild, without special odor; lamellae white, equal, margin entire, forked next the stipe, venose-connected, broadest next the margin, adnate, thin, subdistant; stipe white, inclined to be pointed at the base, spongy-stuffed to hollow, glabrous, rugulose, up to 7 cm. \times 2 cm.; spores cream-white, ellipsoid to egg-shaped, echinulate, uniguttulate, 8.7-10 \times 7.5 μ .

TYPE LOCALITY: Stow, Massachusetts.

HABITAT: In swamp, gregarious, August 27 to September 22.

DISTRIBUTION: Found also at South Acton, Massachusetts, and Wardsboro, Vermont.

RELATIONSHIP AND CHARACTERISTICS: This species seems to belong with the Subvelutinae group, although the nearly white spores might remind one of the Purpurinae group. The pileus is more velvety-pruinose when young, and more broken into areolae when mature than is the case with species of the latter group, and is more brilliant than in any other species having a mild taste and nearly white spores. The stem is white or has merely a blush of red. The description of *Russula paludosa* Britz. as given in Revis. Hymen. IV: 17. 1899, agrees with this species except in the simple lamellae and the scabrous margin of the pileus; but if *R. paludosa* is the same as *R. elatior* Lindbl. as Maire thinks¹ then there is no question regarding the two being distinct; since I have several specimens of *R. elatior* Lindbl. which Professor Romell sent me, and *Russula pulchra* is quite distinct. *Russula elatior* has very much the same appearance as our *Russula rubrotincta*. In fact, specimens of this which I sent to Professor Romell he thought must be that species and suggested to me that I be sure that young specimens of the plants

¹ Bull. Soc. Myc. France 26: 65.

which I had sent him were not acrid. During the following season I tested these in all stages and found the taste in all cases to be sweet and nutty, reminding one of the taste of beechnuts. The spores of *Russula pulchra* appear white except in mass on white paper when they show cream-white. Under the microscope, the spores appear much rougher than spores of *R. uncialis* Pk. The color of the spores in mass will serve to distinguish the species from *R. subvelutina* Pk.

***Russula perplexa* sp. nov.**

Pileus becoming centrally depressed to infundibuliform, up to 7 cm. broad; surface Acouje-red to Dragon's blood-red or salmon-buff with amaranth-purple intermixed in the center, or even salmon-buff in the center to Apricot-yellow or coral-pink elsewhere, viscid when wet, cuticle separable nearly to the center, pruinose, otherwise glabrous; margin tuberculate-striate, inrolled; context white, thin toward the margin, mild, without special odor when fresh but sour in drying, fragile; lamellae white, equal, simple, margin entire, broadest at outer end, adnate, close, thin, pruinose; stipe white washed with red, tapering downward, becoming hollow, 7.5 cm. long by 5 mm. thick; spores white, echinulate, ellipsoid, apiculate, $10 \times 7.5 \mu$ including the apex.

TYPE LOCALITY: Stow, Massachusetts.

HABITAT: Mixed woods in a swamp, gregarious to solitary, July 30 to September 14.

RELATIONSHIP AND CHARACTERISTICS: This species belongs in the Purpurinae group. It differs from *R. uncialis* Pk. in its larger size, infundibuliform pileus, and pronounced tuberculate-striate margin; from *R. purpurina* it differs in the edge of the lamellae being even, and the lamellae not becoming yellow with age, and scarcely so in drying; from *R. Linnaei* Fr. in the viscid, pruinose pileus, in the simple lamellae which do not become yellow, and the tuberculate-striate margin. It differs from all of these in the sour odor which develops during drying.

It is about the size and texture of *R. fragiliformis* Burl. and may be recognized by the somewhat vinous-red color, with or without buff color, the infundibuliform mature pileus, the mild taste, and white spores.

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NOTES AND BRIEF ARTICLES

Max W. Gardner, of the Bureau of Plant Industry, has been appointed instructor in plant pathology in the University of Michigan.

F. D. Heald has been appointed head of the new department of plant pathology recently established by the regents of the State College of Washington.

W. J. Spillman, of the United States Department of Agriculture, has been appointed dean of the newly created college of agriculture at the State College of Washington, where he will enter upon his duties on April first.

J. E. Fries, of Birmingham, Alabama, called at the Garden on January 21 with a handsome specimen of the parasitic gill-fungus, *Asterophora Clavus*, preserved in alcohol, which he donated to the Garden collection. While here, he took a full subscription to *North American Flora*.

A number of appointments have recently been made at the Bureau of Plant Industry in Washington: R. A. Jehle, from Florida; J. K. K. Link, from the University of Nebraska; J. C. Walker, from the University of Wisconsin; W. W. Diehl, from Clemson College, South Carolina; D. C. Neal, from Alabama; and H. F. Bergman, from the University of Minnesota.

Phytopathology is now to appear monthly, at \$5.00 a year. The January number, issued late in January, is very handsome and gives promise of even greater success for this important publication.

Several leaf-spot diseases of economic plants in Porto Rico were described by L. E. Miles in the October number of *Phytopathology*.

Chrysomyxa Weirii on *Picea Englemanii*, and *Melampsora occidentalis* on species of poplar were described as new by H. S. Jackson in the October number of *Phytopathology*.

A brief and interesting review of an article by Naumov on "Intoxicating Bread" appeared in the October number of *Phytopathology*, under the authorship of Michael Shapovalov.

A specimen of *Sebacina spongiosa*, described as new by C. G. Lloyd, has been recently collected at Nassau, New Providence, Bahamas, by L. K. Brace and forwarded by him to Dr. Britton for the Garden herbarium.

S. W. Newell reports in the *West Indian Bulletin* that several species of *Rosellinia* cause root diseases in Guadeloupe, Dominica, Martinique, Grenada, and adjacent islands, the plants mostly attacked being cacao, coffee, limes, and arrowroot.

The development of some species of *Pholiota* is discussed by W. H. Sawyer, Jr., in the September number of *The Botanical Gazette*. Three species were used in Mr. Sawyer's experiments, *Pholiota adiposa*, *P. squarrosa*, and *P. flammans*. The paper is illustrated with six plates containing fifty-five figures.

A very important and timely treatise on the control of diseases and insect enemies of the home vegetable garden, by W. A. Orton and F. H. Chittenden, has recently appeared as Farmer's Bulletin 856 of the U. S. Department of Agriculture. This bulletin consists of 72 pages and 82 figures and contains descriptions and methods of control of all the ordinary diseases and insect pests met with in the vegetable garden.

A twig and leaf disease of *Kerria japonica*, due to *Cocomyces Kerriae* sp. nov., is described at some length by V. B. Stewart in the December number of *Phytopathology*. The disease not only causes a premature fall of the leaves but also affects the shoots, often injuring the bushes to such an extent that they die during the winter. A sulphur fungicide is recommended for checking the disease.

The occurrence of walnut blight in the eastern United States is discussed by S. M. McMurran in Bulletin 611 of the U. S. Department of Agriculture. This disease, caused by *Bacterium Juglandis*, has been established on the Pacific coast for some time, where it attacks the Persian walnut. The development of immune or highly resistant varieties is being attempted.

An article on the crown canker disease of roses, with several illustrations, by L. M. Massey, appears in the December number of *Phytopathology*. This disease is caused by *Cylindrocladium scoparium*, which has hitherto been considered a saprophyte and not supposed to occur on roses. No method of control has been discovered, but rose-growers are cautioned to sterilize their soil and use only healthy stock.

John A. Stevenson reports in the December number of *Phytopathology* that a new and alarming cane disease appeared in the western end of Porto Rico two years ago and is still spreading at a rapid rate, with a loss of from ten to fifty per cent. in the crop in two years and a total loss the third year after infection. Continued efforts have been made to ascertain the cause of this mottling disease but without result. All control measures that have been tried have also failed.

Continuing his list of wood-destroying fungi which grow both on coniferous and deciduous trees, James R. Weir lists in the October number of *Phytopathology*, *Daedalea confragosa* on *Abies grandis*, *Daedalea unicolor* on *Abies lasiocarpa*, *Polyporus*

albellus on *Abies grandis*, *Polyporus elegans* on *Tsuga heterophylla*, *Schizophyllum commune* on *Tsuga heterophylla*, *Trametes carnea* on *Arbutus Menziesii*, *Trametes hispida* on *Pseudotsuga taxifolia*, *Trametes serialis* on the aspen, and *Trametes variiformis* on *Betula occidentalis*.

Two very important matters discussed at the recent scientific meetings at Pittsburgh were: (1) the problem of disease control in order to increase crops, and (2) the establishment of a Botanical Abstracts Journal. The first has been taken up with zeal by the phytopathologists under Professor H. H. Whetzel, and the second is in the hands of a representative committee, which hopes to begin such a journal this year, under the editorship of Professor B. E. Livingston. Of the one thousand scientists in attendance at Pittsburgh, about two hundred were botanists.

Sparassis radicata is a new species described by J. R. Weir in the June number of *Phytopathology* from Idaho, where it occurs parasitically on the roots of several western conifers. This species is chiefly distinguished by its thin lobes and an unusually large perennial rootstalk, which is of the nature of a sclerotium and from which new sporophores are developed from year to year. The mycelium attacks the bast of the roots and later the wood, producing a yellow or brown, carbonizing rot. The species has been found in British Columbia, Washington, Oregon, Idaho, and Montana.

It is reported by Trumbull and Hotson in the December number of *Phytopathology* that the very attractive forestry building of the Alaska-Yukon-Pacific Exposition at Seattle, which was built of green logs of Douglas fir and western hemlock, has been seriously attacked by *Fomes unguis*, and that many of the sporophores of this fungus have appeared on the logs used in the building. A heating system was installed to dry the timbers and impregnation of the wood with fungicides was tried, but without result. Roentgen rays were then experimented with, but the effects observed on the fungi were negative.

A very handsome and beautifully illustrated handbook of the Amanitas of the eastern United States, by W. C. Coker, appeared last summer as a double number of the *Journal of the Elisha Mitchell Scientific Society*, published at Chapel Hill, North Carolina. This handbook contains the results of the work of years in the vicinity of Chapel Hill and other parts of eastern North America. Dr. Coker and his assistants have collected a great many specimens and made excellent notes and photographs of them. Seven species of *Amanitopsis* are recognized and nearly thirty species of *Amanita*, most of them illustrated with halftones. Although some mycologists may not entirely agree with all of Dr. Coker's conclusions, they cannot question his scientific activity and the quality of his photographs.

A very interesting collection of fleshy and woody fungi was recently sent to the Garden for determination by Miss M. McKenny, of Olympia, Washington. The collection contained good dried specimens, colored drawings, complete field notes, and spore prints. Some of the specimens were also dipped in paraffin and sent in a fresh condition; a method which seems to work very well with firm specimens that are not infested with insects. Among the species in this collection, may be mentioned: *Armillaria albolanatipes*, a perfectly sterile form of *Stropharia ambigua*, and a species of *Venenarius* which seems to lie somewhere between *V. pregammatus* and *V. umbrinidiscus*. Miss McKenny also reports having tested *Stropharia ambigua* and found it to be edible; which is a valuable thing to know, since this species is exceedingly abundant on the Pacific coast.

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